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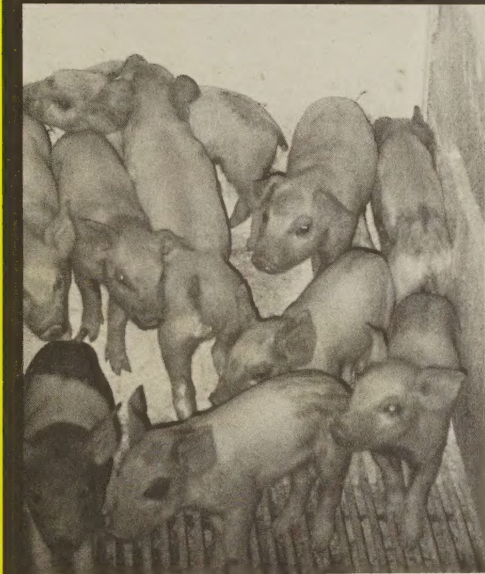
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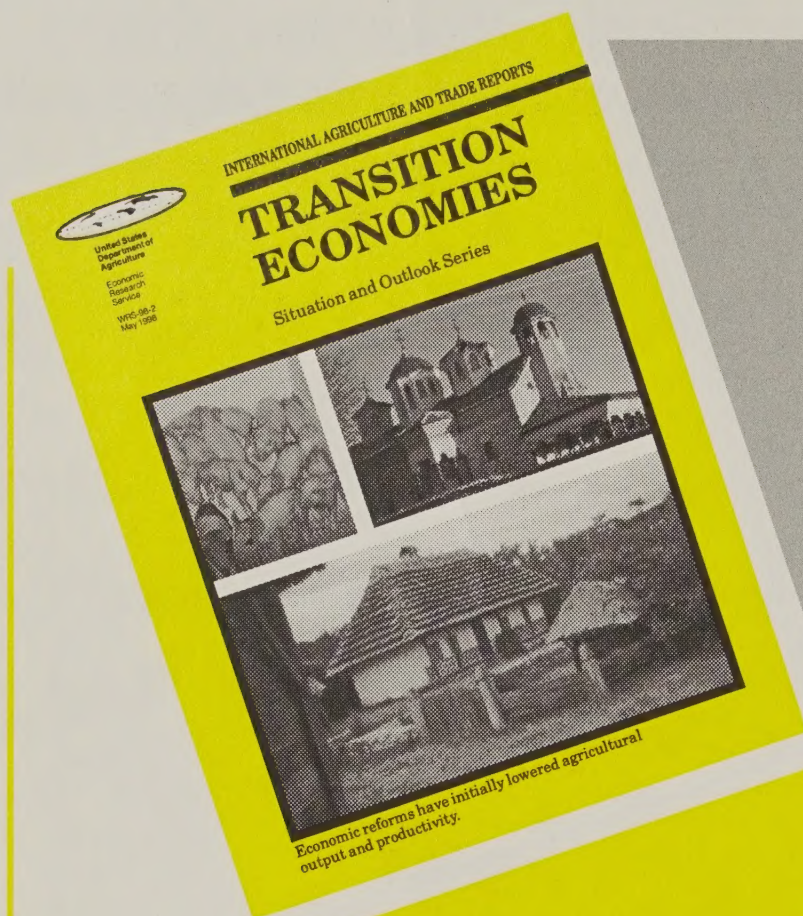
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Department of
Agriculture**

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Service

WRS-98-2
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TRANSITION ECONOMIES

Situation and Outlook Series

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Preface

The articles presented in this report are drawn from the major research projects of the Market and Trade Economics Division of ERS concerning agriculture in the transition economies of Central and Eastern Europe and the New Independent States.

The term “*New Independent States*” (NIS) used throughout this report refers to the 12 countries that comprised the former USSR. The “*Baltic*” countries (Estonia, Latvia, Lithuania) are not included in the NIS as they were not recognized by the United States as part of the then Soviet Union. The 12 NIS countries are the Russian Federation, Ukraine, Belarus, Kazakhstan, Moldova, Armenia, Azerbaijan, Georgia, Uzbekistan, Turkmenistan, Kyrgyzstan, and Tajikistan.

The phrase “*terms of trade*” referred to throughout the report means the terms, or prices, at which agricultural producers “exchange” output for inputs. It is measured by comparing agricultural output prices to input prices, such that if input prices rise relative to output prices, the producers’ terms of trade *worsen*, or *deteriorate*. The concept of terms of trade can apply to any situation in which there is exchange of goods, such as the terms (prices) at which a country trades its exports for imports. However, unless otherwise indicated, the phrase is used in this report as defined above.

Throughout the report, “*economic reform*” in the transition economies is defined as changes in institutions and policies that help foster the development of a market economy. Institutional reform includes privatization and the creation of market infrastructure, such as systems of market information, banking and finance, and commercial law. Macroeconomic reform policies include reducing inflation, tightening monetary and fiscal policy, and stabilizing the exchange rate. Trade liberalization is defined as reducing direct state management of trade, as well as specific trade controls, such as tariffs and quotas.

Keywords: Trade, forecast, meat, grain, livestock sector, transition economies, relative prices, privatization, farm structure, private sector, institutional reforms, land markets, market infrastructure, efficiency, restructuring, reform.

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Summary

Economic Reform's Initial Impact Has Been Lower Production, Lower Productivity

Economic reform in the transition economies of Central and Eastern Europe and the New Independent States (NIS) of the former USSR has initially reduced both agricultural output and productivity. The livestock industry has been particularly hurt. The main way by which agricultural output can rebound in the transition economies is through productivity growth, which by lowering costs of production, would make domestic output more competitive with foreign imports.

The first of three articles presented in this report examines restructuring in the livestock sector; the second presents long-term forecasts (to 2005) of Russian and Ukrainian agricultural production and trade; and the third analyzes the effect of reform on the economic efficiency of Russian crop producers.

The main effect of economic reform on agriculture in the transition economies has been the severe contraction of the livestock sector. Since reform began, both livestock inventories and output in most countries of the region have dropped 30-50 percent.

The contraction has been mainly due to the reform policies of price and trade liberalization, which means that the downsizing has been an inevitable part of market reform. Price liberalization and the reduction of producer subsidies have led to a worsening of producers' terms of trade (as input prices rose much more than prices for output). With trade liberalization, producers were suddenly exposed to higher quality and less expensive agricultural imports. In some countries, all this was compounded by disruption following land reform and the liquidation of agricultural cooperatives.

However, in certain transition economies, such as Poland and Hungary, the livestock sector is beginning to stabilize, and even rebound. For example, hog inventories have stopped falling in both countries, and poultry numbers are clearly rising. The main reasons for the resurgence are that productivity (especially of feed) and the quality of output are improving, and the institutional supports for market-oriented agriculture are being created. All these developments allow domestic producers to compete better with imports, and even to export certain products. Incentives to improve productivity and quality of output have been greater in Poland and Hungary than in the slower reformers because the two countries have more extensively privatized their agriculture and enacted policies to prepare for accession to the European Union.

Although Poland and Hungary are among the faster reformers of the region, Russia and Ukraine are the transition countries whose agriculture most affects world markets. USDA forecasts that Russia will remain a major importer of meat, with net imports at about 2.5 million tons by 2005. The forecast assumes slow recovery in GDP, which will increase consumer demand, and only modest productivity growth within the livestock sector. The moderate growth in productivity will not be sufficient to overcome Russia's current comparative cost disadvantage in meat production.

Russia is forecast neither to return to the large grain imports of the pre-reform period nor to become a large grain exporter. Net grain imports by 2005 are predicted at about 2.5 million tons, the bulk being wheat. Ukraine, however, is forecast to be a modest net exporter of grain.

The main way that agriculture in the transition economies can become more competitive on the world market is by raising productivity, that is, getting more output from a given amount of input, which would reduce unit costs of production. A concept related to productivity is economic efficiency, defined for producers as attaining *maximum* output from a given quantity of inputs. The Economic Research Service is completing a study that examines the efficiency of Russian crop producers during the reform period. The study finds that although under reform agricultural efficiency has generally decreased throughout the country, those regions that were more efficient under the Soviet regime have experienced only a slight decline in efficiency. However, those regions that were less efficient have suffered a major decline in efficiency under reform.

A likely explanation is that farms that were relatively less efficient at the beginning of reform, say because of poor management, have had a harder time coping with the challenges of reform. They have therefore performed even less well than before compared with more efficient farms. Yet, farms in less efficient regions are likely to be favored with state subsidies, which have the effect of both keeping the farms in business and reducing incentives to improve performance.

The study also concludes that farms tend to be more inefficient (1) the larger they are (in area); (2) the more heavily subsidized they are; and (3) the more diversified they are in their output mix. The last point indicates that Russian farms become more efficient the more they specialize in producing crops in which they have a comparative cost advantage.

Restructuring of the Livestock Sectors in the Transition Economies of the NIS and Central and Eastern Europe

Among five transition economies, Poland, Hungary, Romania, Russia, and Ukraine, Poland and Hungary have advanced the farthest in the restructuring of their livestock sectors. Their relative success is due to more extensive privatization, reform of marketing infrastructure, and policies aimed to prepare for EU accession. All five countries face common obstacles, however, such as undeveloped land markets, lack of a rural credit system, and a relatively immobile labor force. [Nancy Cochrane, Britta Bjornlund, Mildred Haley, Roger Hoskin, and Olga Liefert]

One of the most dramatic adjustments that took place once the economies of Central and Eastern Europe (CEE) and the New Independent States (NIS) began to be liberalized was a virtual free fall in the livestock sector. Consumer and producer subsidies were nearly or completely eliminated, and producers were exposed to international competition. Consumer demand for meat plummeted and producers were increasingly squeezed between falling output prices and skyrocketing production costs. The result was a drastic decline in livestock inventories of all categories. Between 1990 and 1995, hog numbers fell 48 percent in Hungary and 38 percent in Russia; cattle numbers fell 27 percent in Russia and 46 percent in Romania.

Seven years after the beginning of the transition, this decline appears to have ended in some of the transition economies while continuing in others. In Poland and Hungary, for example, hog numbers have been fairly constant in the last 2 years and poultry numbers are actually rising. Inventories are still falling, however, in Russia and Ukraine, and cattle numbers continue their decline throughout the region.

This paper examines the restructuring of the livestock sectors of five different countries: Poland, Hungary, Romania, Russia and Ukraine. We define restructuring as the reallocation of all factors of production—land, labor, and capital, as well as material inputs—in response to the changes in relative prices that came with the transition. When faced with higher prices, producers throughout the region rapidly adjusted by decreasing their use of material inputs, but the movement of land, capital, and to some extent labor has been more problematic. Countries such as Poland and Hungary have gone the furthest in the restructuring process, while others are only now beginning serious changes. As we examine the changing structure of livestock markets in the five countries, we will attempt to enumerate some of the policy and institutional factors that have allowed restructuring to progress further in some countries than in others. We will end with some projections regarding the future structure of the livestock sectors in these countries and directions for further research.

Background: Causes of the Restructuring

Though restructuring in the five countries began at different starting points, it was triggered by similar developments. Each country's livestock sector endured common shocks including a worsening terms of trade (ratio of output to input prices), integration into the world economy requiring competition with foreign producers, and falling consumer demand for livestock products following the removal of consumer subsidies and lowered real income.

Price and Trade Liberalization

The impact of price and trade liberalization was much greater on the livestock sector than the crop sector because both producers and consumers of livestock products were very heavily subsidized under communism. Price liberalization substantially reduced consumers' real income (as prices increased more than wages and salaries), and thereby lowered purchasing power. Demand for meat products is quite sensitive to changes in income, while demand for staple products, such as bread and potatoes, is less sensitive. The result was an almost immediate drop in consumer demand for meat.

With exposure to the world market and the reduction of subsidies, livestock producers faced an abrupt increase in production costs. Prices throughout the economy adjusted immediately to reflect real costs of production. For the livestock sector, the result was worsening terms of trade—prices of agricultural inputs rose by a greater percentage than output prices. From 1991 to 1996, for example, farmgate prices for all meats in Russia rose only about 25 percent as much as prices for mixed feed. In recent years livestock producers' terms of trade have started to stabilize at a level that better reflects real costs. But because prices for energy and fuel in Russia and Ukraine are still kept below world prices, further price liberalization is likely to worsen these countries' agricultural terms of trade.

Exposure to world competition has proven a great shock to the livestock sectors. The region has been generally uncom-

petitive in livestock production vis-a-vis the world market, in terms of both price and quality. The collapse of CEMA (Council for Mutual Economic Assistance) trade arrangements and uncompetitive local livestock sectors allowed a flood of imports from the west. In particular, poultry imports from western countries have surged in both Russia and Ukraine. Although Poland, Hungary, and Romania were traditional exporters of poultry to the former Soviet Union, they have not been able to compete in the NIS market with exports from western countries, particularly the United States. Pork imports to the region have also grown substantially.

Changes in Farm Structure

Early in the transition, state farms and cooperatives, more so in the CEE's than in the NIS countries, were privatized, restructured, or liquidated. This process was generally accompanied by a wholesale transfer of animals into private hands. The new owners lacked adequate facilities to keep the animals and could not afford proper feed, which led to widespread slaughter or export of live animals. In many cases, prize breeding animals were slaughtered. Animals that remained on large state-owned complexes usually did not fare any better. The state complexes were often heavily indebted and short of cash. Even when supported by soft loans from the government, they still lacked the finances to maintain proper feed rations and have significantly reduced herds in response.

Response of Livestock Producers

Drastic changes in relative prices as well as changing agricultural policies and institutions have demanded marked adjustments for livestock producers throughout the region. The private sector share of animal production and meat output has increased significantly in all the countries (tables 1 and 2). But this shift has been slower in NIS countries, such as Russia and Ukraine, than in the CEE countries. Moreover, decisions of new private producers are strongly influenced by their relationships with the former state owned enterprises—both the “transformed” state and cooperative farms and the processing enterprises.

Feed is the main input and cost component in meat production, and feed productivity (live weight gain per unit of feed) declined in all the countries in the early years of the transition. The decline stemmed directly from a shift to lower cost feed ingredients. Farmers, no longer able to afford a balanced feed mix for animals, sharply reduced the use of costly mixed feeds, switching to lower concentrated feeds that are poorly balanced with proteins and other supplements. Hog producers switched from high protein grains and oilmeal to less costly concentrated feed; cattle producers turned away from relatively expensive concentrated feed in favor of forage crops and pasture grazing.

In the CEE's hogs fared better through these changes than poultry or cattle, while cattle fared better in the NIS. Poultry

Table 1--Share of private sector in livestock inventories, 1991-97 1/

	1991	1992	1993	1994	1995	1996	1997
-- Percent --							
Russia							
Cattle	17	20	23	26	28	30	33
Of which cows	26	28	32	36	38	40	42
Hogs	19	22	25	29	33	35	40
Poultry	30	31	33	33	35	39	41
Ukraine							
Cattle	14	15	16	18	20	22	na
Of which cows	26	28	30	33	36	39	na
Hogs	28	30	32	36	42	46	na
Poultry	46	47	51	56	61	64	na
Poland							
Cattle	84	86	89	91	92	92	93
Of which cows	na	na	na	na	na	na	na
Hogs	75	75	82	86	87	86	87
Poultry	85	84	87	88	87	87	na
Hungary							
Cattle	50	50	50	50	27	28	31
Of which cows	na	na	na	na	na	na	na
Hogs	54	52	54	52	53	55	56
Poultry	na	na	na	na	66	61	62
Romania							
Cattle	72	78	85	88	90	90	93
Of which cows	na	na	na	na	na	na	90
Hogs	33	43	53	57	58	58	72
Poultry	41	50	58	66	63	69	85

na = Not available.

1/ Private sector includes household plots and private farms.

Sources: Statkom SNG, 1996; Statistical yearbooks of the NIS/B countries, 1996, 1997; Ministry of Agriculture, Romania, Statistical yearbook of Hungary, Poland.

Table 2--Share of private sector in meat output, 1991-97 1/

	1991	1992	1993	1994	1995	1996	1997
-- Percent --							
Russia							
Total meat	31	36	41	45	50	51	55
Beef & veal	18	23	29	36	42	41	na
Pork	43	51	57	61	65	65	68
Poultry meat	33	34	32	31	35	49	na
Ukraine							
Total meat	32	35	41	44	52	56	62
Beef & veal	11	14	17	23	31	36	na
Pork	47	54	64	69	75	78	na
Poultry meat	54	56	59	66	73	83	na
Romania							
Total meat	na	na	na	na	na	na	na
Beef & veal	74	70	77	82	84	88	na
Pork	52	60	59	58	59	65	na
Poultry meat	61	67	65	68	63	71	na

1/ Private sector includes household plots and private farms.

Sources: Statkom SNG, 1996; Statistical yearbooks of the NIS/B countries, 1996, 1997; Ministry of Agriculture, Romania.

The Lessons of Transition for Agriculture

ERS has begun a research project to identify the lessons of transition for agriculture, given that sufficient time has now elapsed since reform began for lessons to emerge. The lessons should help western policy makers and agencies advise the current transition countries on agricultural reform. They should also help in future work in any remaining unreformed centrally planned economies, such as Cuba and North Korea, should they also begin to reform.

One lesson evident from the restructuring of the livestock sector is that as an inherent part of market reform, production of certain goods must fall. Reform means that consumers' preferences replace planners' desires as the driving force in determining output. Production of those goods favored by planners but not by current consumers will inevitably drop, particularly when price liberalization leads to prices that reflect the real costs of production.

The downsizing of the livestock sector has raised concerns among both eastern and western policy makers about potential food security problems. As explained in this article, the contraction is not the result of a supply-side breakdown in production capability. Rather, it is a correction to the overexpansion of food production in the countries before reform. Per capita consumption of most food remains high compared to both nutritional requirements and consumption in other countries with roughly the same level of per capita real income.

Although certain groups suffer from deficient diets, this is mainly a problem of poverty and inadequate purchasing power. Two groups are the most vulnerable to food insecurity. The first is pensioners and other state dependents, whose benefits from the state social welfare system are inadequate. The second is workers who lose their jobs because their employing industries are producing goods favored by the old regime but not by current consumers. The most cost effective way to help these groups is through well-targeted transfers of money income, as well as retraining for those made unemployed.

Other more specific lessons of transition for agriculture can be found in the reform experience of countries such as Poland, Hungary, the Czech Republic, and the Baltic States, which are reforming their agriculture more quickly than Romania, Bulgaria, and the NIS. In the former group, agricultural output is rising (or at least not falling as much as in the slower reforming countries), the quality of output is improving, and institutional reform—particularly privatization and creation of market services that support agriculture—is proceeding more quickly. All of these factors are evidence of faster progress toward market reform. By analyzing the reasons why certain transition countries are reforming their agriculture and food economies more quickly and effectively than others, one can identify lessons for the slower reformers. An approach we will follow will be to identify the obstacles to agricultural reform that all transition economies face, and then explain how the faster reforming countries are surmounting these reform hurdles. [William Liefert]

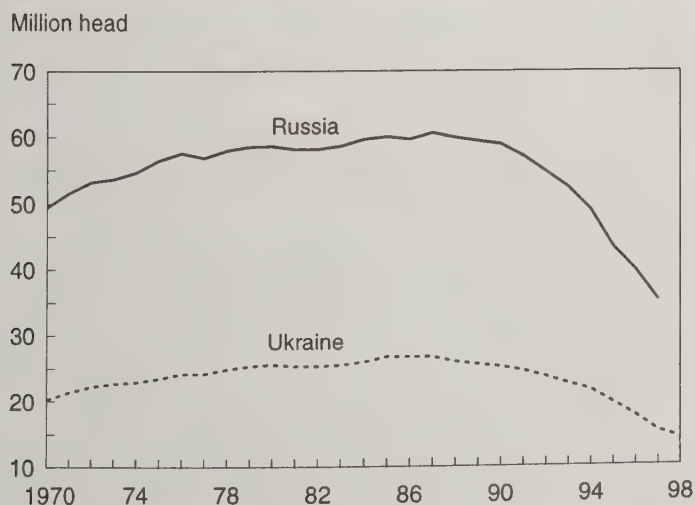
are more dependent on high quality protein feed and suffered more from the deterioration in feed quality. Cattle in the CEE's were severely affected because of changes in the dairy market plus the wholesale liquidation of cooperatives. Cattle throughout the region are mainly dairy cattle; beef comes from culled cattle and young bulls. Dairy products were very heavily subsidized under the communist system, and the removal of those subsidies greatly reduced the supply and demand for dairy products. Cattle also demand more land, and with the liquidation of cooperatives in the CEE's, cattle were often distributed to private producers who did not have the land on which to keep them. In contrast, collective farms in the NIS, where cattle were concentrated, have been transformed into corporate farms, but remain largely intact, such that more land is available for grazing. Hogs in the NIS, on the other hand, were concentrated on huge complexes that have been hit hard by the restructuring process.

Response of Russian and Ukrainian Producers

In 1997, aggregate animal inventories and meat production in both Russia and Ukraine were down for the eighth straight year (figures 1-3). Since 1991, the year the Soviet Union broke up, Russian cattle inventories have decreased by 44 percent (with cows down 30 percent). Russian hog numbers declined by about 55 percent, and poultry by 50 percent (table 3).

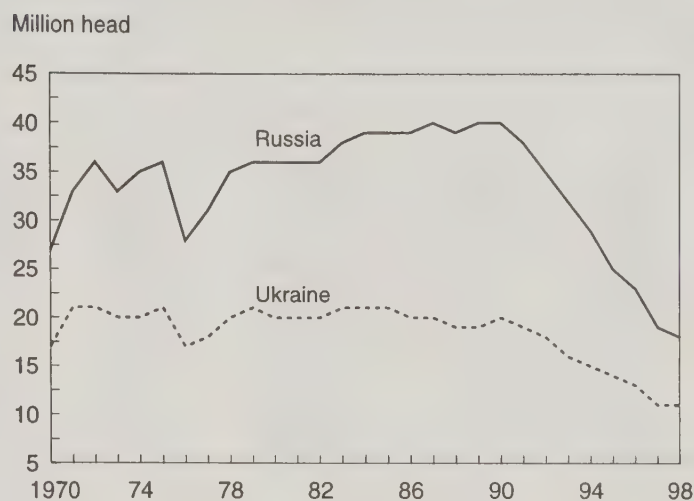
Falling inventories and declining animal productivity in Russia and Ukraine have led to sharp decreases in production of all types of meat, milk, and eggs (table 4). Since 1991, total meat output (beef, pork, poultry, and mutton) has dropped almost 50 percent in Russia, and 55 percent in Ukraine. In both countries poultry production has declined the most (65 percent in Russia and 72 percent in Ukraine), followed by pork at more than 50 percent in Russia, and beef at more than 40 percent (figures 4 to 6).

Figure 1
Cattle Inventories, January 1, Russia and Ukraine



Sources: Statistical yearbooks of the NIS.

Figure 2
Swine Inventories, January 1, Russia and Ukraine



Sources: Statistical yearbooks of the NIS.

Figure 3
Poultry Inventories, January 1, Russia and Ukraine



Sources: Statistical yearbooks of the NIS.

The terms of trade deteriorated most significantly for poultry producers and the least for beef producers, even though farmgate prices for poultry have increased the most since 1991, and beef prices the least. The explanation for this apparent paradox is that poultry production depends heavily on certain inputs, specifically mixed feed and energy (fuel), which during the Soviet period were extremely low in price relative to other costs of production (poultry was mainly produced in the highly subsidized large-scale state complexes). Price liberalization caused input prices to increase significantly. Although farmgate prices for poultry producers have risen substantially, input prices faced by these producers have risen proportionately more, thereby worsening the terms of trade more than for other meat producers. Beef production, on the other hand, is less energy-intensive, and also

Table 3-- Livestock inventories by type of ownership, January 1, 1991-97

	1991	1992	1993	1994	1995	1996	1997
Total							
-- 1,000 head --							
Russia							
Cattle	57,043	54,677	52,226	48,914	43,296	39,700	35,100
Of which cows	20,557	20,564	20,243	19,831	18,398	17,400	15,900
Hogs	38,314	35,384	31,520	28,557	24,859	22,600	19,100
Sheep, goats	58,195	55,255	51,368	43,712	34,540	28,000	22,800
Poultry	659,800	652,200	568,200	565,200	490,800	422,600	372,000
Ukraine							
Cattle	24,623	23,728	22,457	21,607	19,624	17,557	15,300
Of which cows	8,378	8,263	8,057	8,078	7,818	7,531	6,930
Hogs	19,427	17,839	16,175	15,298	13,946	13,144	11,200
Sheep, goats	8,419	7,829	7,237	6,863	5,575	4,100	2,950
Poultry	246,100	243,100	214,600	190,500	164,900	149,700	129,400
Private sector 1/							
-- 1,000 head --							
Russia							
Cattle	9,866	10,771	12,012	12,669	12,166	11,989	11,408
Of which cows	5,242	5,778	6,559	7,060	6,973	6,960	6,742
Hogs	7,088	7,820	8,006	8,282	8,129	7,910	7,564
Sheep, goats	16,120	17,240	18,698	17,922	16,165	14,504	12,859
Poultry	195,000	201,000	190,000	186,000	172,000	163,000	153,000
Ukraine							
Cattle	3,540	3,537	3,643	3,869	3,856	3,856	na
Of which cows	2,187	2,275	2,429	2,628	2,799	2,936	na
Hogs	5,356	5,276	5,245	5,549	5,864	5,992	na
Sheep, goats	1,253	1,412	1,623	1,852	1,742	1,675	na
Poultry	113,206	114,257	109,446	106,680	100,589	95,808	na

na = not available.

1/ Private sector includes household plots and private farms.

Sources: Statkom SNG, 1996; Statistical yearbooks of the NIS/B countries, 1996, 1997; ERS estimates.

allows for greater substitution of forage crops and pasture grazing for mixed feed.

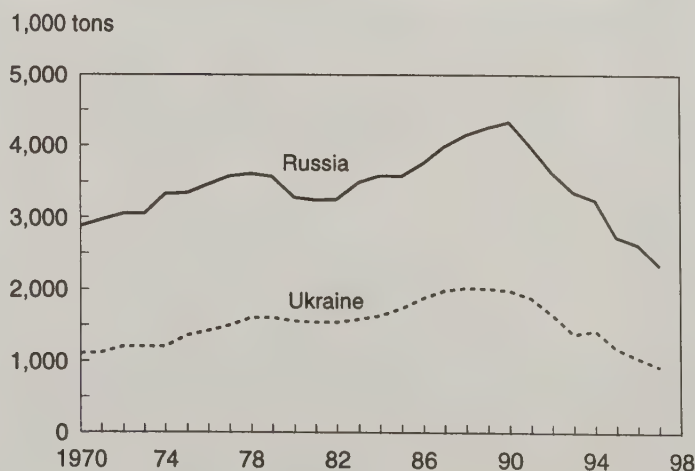
Feed productivity has continued to worsen in Russia and Ukraine, where feed conversion rates are currently about four times higher than U.S. rates for beef output, and three to four times higher for pork. Declining feed productivity has coincided with falling animal productivity (output per animal). In Russia from 1990 to 1996, annual weight gain per animal dropped about 45 percent for both cattle and hogs. In Ukraine the decrease during 1990-1995 was 40 percent for cattle and 49 percent for hogs.

Poor animal health care and genetics, as well as improper culling of herds, are responsible for the falling animal productivity. For 6 consecutive years (starting 1991) in Russia and Ukraine, births rates per animal declined, death rates rose, and animal slaughter weight fell. The rates showed marginal improvement in 1997 in Russia.

Falling animal productivity has led to longer feed-out times for livestock. For example, in 1996, the feed-out time for

hogs was nearly 18 months compared to less than a year in 1990. Comparable U.S. feed-out times are about 6 months. Longer feed-out times effectively substitute labor for expen-

Figure 4

Beef and Veal Production, Russia and Ukraine

Data for Ukraine for 1973-74 are extrapolated.
Sources: Statistical yearbooks of the NIS.

Table 4--Output of livestock products by type of ownership, Russia and Ukraine: 1991-1997

	1991	1992	1993	1994	1995	1996	1997
Total							
-- 1,000 tons --							
Russia							
Total meat	9,375	8,260	7,513	6,803	5,796	5,336	4,802
Beef & veal	3,989	3,631	3,359	3,240	2,734	2,630	2,341
Pork	3,190	2,783	2,432	2,104	1,865	1,705	1,560
Lamb & goat meat	347	329	359	315	261	230	196
Poultry meat	1,751	1,428	1,277	1,069	859	690	630
Milk (Million tons)	52.0	47.2	46.5	42.2	39.2	35.8	34.2
Eggs (Billion pieces)	46.9	42.9	40.3	37.5	33.8	31.9	32.0
Ukraine							
Total meat	4,029	3,401	2,815	2,678	2,294	2,113	1,836
Beef & veal	1,878	1,656	1,379	1,427	1,186	1,048	926
Pork	1,421	1,180	1,013	916	807	789	668
Lamb & goat meat	40	35	31	44	40	32	29
Poultry meat	654	498	362	265	235	218	184
Milk (Million tons)	22.4	19.1	18.4	18.1	17.3	15.9	13.7
Eggs (Billion pieces)	15.2	13.5	11.8	10.2	9.4	8.8	8.2
Private sector 1/							
-- 1,000 tons --							
Russia							
Total meat	2,866	2,970	3,050	3,035	2,905	2,727	2,651
Beef & veal	715	845	989	1,177	1,154	1,070	na
Pork	1,363	1,418	1,397	1,275	1,219	1,100	1,060
Lamb & goat meat	172	184	218	213	195	185	na
Poultry meat	579	481	404	332	300	335	na
Milk (Million tons)	13.6	15.1	16.6	16.9	16.8	17.0	16.0
Eggs (Billion pieces)	10.4	11.2	11.0	10.9	10.3	10.0	10.0
Ukraine							
Total meat	1,274	1,183	1,143	1,169	1,193	1,182	1,138
Beef & veal	207	225	241	322	373	373	na
Pork	670	636	646	628	606	620	na
Lamb & goat meat	16	16	16	22	22	22	na
Poultry meat	355	280	214	176	171	181	na
Milk (Million tons)	5.9	6.1	6.7	7.2	7.7	8.0	8.0
Eggs (Billion pieces)	5.9	6.0	5.7	5.5	5.3	5.0	5.0

na = not available.

1/ Private sector includes household plots and private farms. Meat in carcass weight, including raw fat.

Sources: Statkom SNG, 1996; Statistical yearbooks of the NIS/B countries, 1996, 1997.

sive manufactured feed. On-farm produced feed is the main input. Feed-out times for cattle are also longer.

The declining terms of trade and resulting shifts in feeding practices can be observed in both the state and private sectors. The majority of the decline in output, however, has occurred in the state sector, while the private sector has been able to maintain output. The share of livestock inventories and meat products produced in the private sector continues to grow. In 1997, household farms accounted for 40 percent of Russian hog numbers, up from 18 percent of 38 million head in 1991. The private sector's share in meat output is even greater than its share in livestock inventories. Thus, 35 percent of private hog inventories in Russia in 1996 pro-

vided 65 percent of all pork produced. The corresponding numbers for Ukraine are 45 and 75 percent.

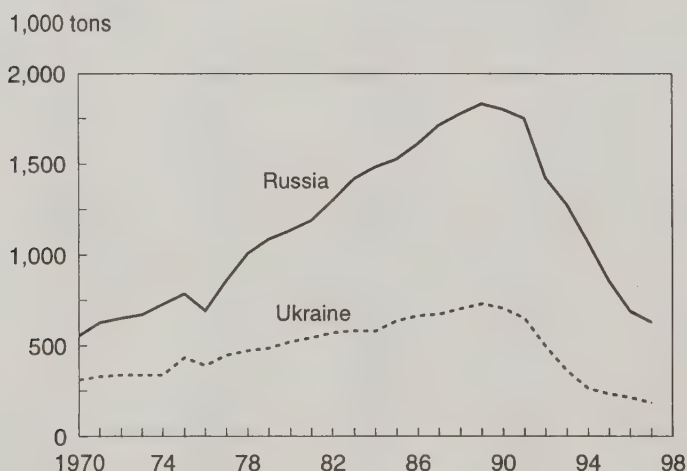
Developments in Russia and Ukraine can be explained to a great extent by the path that has been taken toward privatization and the relationships that have developed between the state and private sectors. The private sector in both countries is dominated by household plots as opposed to true private farms. Household plots existed parallel to the state and collective farms during the Soviet period, while private farms are the genuine "children" of market reform. According to official statistics, state farms provide 47 percent of meat output, household plots 52 percent, and private farmers less than 2 percent. Among the three types of livestock producers in Russia and Ukraine, the first two have developed over

Figure 5

Pork Production, Russia and Ukraine

Data for Ukraine for 1973-74 are extrapolated.
Sources: Statistical yearbooks of the NIS.

Figure 6

Poultry Production, Russia and Ukraine

Data for Ukraine for 1973-74 are extrapolated.
Sources: Statistical yearbooks of the NIS.

time a strong interdependence. In contrast, true private farms have not been able to develop to their potential.

The household plots. Even before the breakdown of the Soviet Union, household plots produced a lion's share of livestock products. The state farms had no incentives to produce beyond the state-imposed administrative levels of output. Farm workers had strong incentives to minimize their labor committed to the collective work activities of the farm (subject to disciplinary constraints), while maximizing work and output at their household plots. In this way a symbiosis developed between state and collective farms and private plots, where neither could survive without the other. The state farm got cheap (though unproductive) labor, providing in return a small but guaranteed income, social welfare support, and access (illegal though widespread) to farm

resources such as feed, energy, infrastructure, and transportation. This relationship has persisted and become stronger during the reform period. Even as inputs became more expensive and scarce for farms, farm workers continued to "procure" farm resources (feed in particular) for their own purposes.

Private farms face greater difficulties. Unlike household plots, whose share in livestock production and inventories is large and has been growing since the beginning of reform, the share of private farms in livestock output has been insignificant throughout the reform period. Private farms operate under different conditions than former state and collective farms and household plots, in ways that discourage livestock production. These conditions involve initial investment, financial security, access to inputs, infrastructure, support services, and marketing opportunities.

- To start a livestock operation requires a substantial initial investment to acquire a herd, the investment being much larger than that required to begin crop production. Because of institutional constraints enumerated below, commercial credit is difficult to obtain. Household plots on the other hand do not require any initial investment to produce livestock goods, as peasants can get animals virtually free from their "mother" state farms.
- Inputs crucial for livestock production (feed and energy) are largely free for the household plot producers, who procure them from their mother farm. In contrast, private farmers must not only pay full price for inputs, but also find suppliers in the first place.
- Livestock output per animal suffers without support services (animal health care and genetics, proper culling of herd). Private farmers usually can not afford such services, while household plots get them for free as part of the state farm infrastructure.
- Household plots do not have to market the majority of their livestock products. A significant part of output is consumed by the producers or bartered with neighbors, while the rest is sold either to the mother farm (mostly milk, which is then sold to large processors) or at the local market (transportation often provided by the mother farm). Private farmers must market perishable goods in an unfriendly institutional environment. They have to tap into a distribution system, rent or invest in refrigeration capacity, storage, and transportation—all things that household plotters can get virtually for free.
- Household plotters enjoy not only guaranteed minimum income, health care and retirement benefits (though these benefits are not overly handsome) from their mother farm, but also face almost no business risk, given that their mother farm functions as a resource base. Private farmers are completely on their own functioning in a somewhat hostile political environment.

Soft Budget Constraint Inhibits Restructuring of State Farms. While the majority of former state and collective farms in Russia and Ukraine have been “corporatized” or “privatized,” in most cases farm management has not changed. Farms continue to be subsidized by the state through soft loans and indirect subsidies. Often, government subsidies to the farms are provided in kind, frequently through the provision of inputs. This leads to distortions in resource allocation. It also prevents the development of private credit markets.

Payment in kind has increased due to the lack of circulating cash especially within the state sector. The shortage of cash payments, along with high transactions costs associated with official marketing channels (see below), has caused spontaneous markets to appear on the streets. Fresh meat products, for example, can be found at these markets at prices that are as much as 30 to 40 percent lower than in city markets. Because of the poor economic situation on most farms, it is likely that payments in kind will increase. At the same time, low incomes will stimulate growing sales at the farmers’ markets and fewer sales in the state sector retail shops.

All farms have adjusted in their use of production factors. Because of the transition, prices of material inputs and capital have risen substantially, whereas land is virtually free, and wages are very low. Thus producers have a strong incentive to use as much land as possible and to shift to labor intensive production practices. Household producers made this adjustment very quickly and were able to maintain their absolute level of production. The state farms, however, because of continued availability of soft loans, have not been forced to make the complete adjustment, and output has fallen accordingly.

But the situation is changing for Russian producers. Beginning in 1994 the Russian government significantly reduced state subsidies to the former state and collective farms. The budget cuts weakened support flows from these farms to household plots, which promptly hurt their operations. The result was a decrease in inventories of all species in the household plots between 1994 and 1997.

The Response of Producers in Romania

Romania’s situation is similar to that of Russia and Ukraine in that until the elections of 1996 its government was reluctant to move forward quickly with the reforms. Large state-owned livestock complexes still have a substantial presence, and much of the processing sector is also state owned. Also, like Russia and Ukraine, the private sector is dominated by very small farms operating on a low level of technology. But a major difference is that the symbiotic relationship between private farmers and the state and cooperative farms was broken early in the transition. Cooperatives were liquidated and their land was distributed to former owners in 1991. Thus Romania’s private farmers were forced to sur-

vive without the assistance of a “mother farm.” Romania’s private farms have survived, but most are subsistence farms and do not produce for the market.

While the cooperatives were liquidated, the state livestock complexes continued intact, with few changes in their management, and there was very little privatization of the state owned processing and distribution enterprises. The result was a highly segmented livestock market, characterized by many small private farms competing in markets with large state conglomerates. In the early years of the transition, there was a substantial drop in animal numbers as animals moved into the private sector. In response, the government implemented a variety of subsidies, border controls, and other support measures, which mainly benefited the state farms. The result of this heavy government support was the apparent turnaround in 1996 (figures 7-9).

In February 1997, Romania’s new government launched an ambitious program of economic reform that included the elimination of government assistance programs, liberalization of prices, reduction of import tariffs, and privatization of state livestock operations. The goal was to privatize all the state complexes by the end of 1998. But, as of December 1997, the situation was as shown in the table 5 below.

The combined effect of the privatization process and the removal of subsidies was a substantial drop in inventories of all species. As of October 31, 1997, cattle numbers fell 6 percent from a year earlier, hog numbers fell 12.5 percent, and poultry 12.8 percent. Virtually all the decline was in the state sector; private sector numbers of all species remained constant.

As a result, the share of livestock on small private farms has increased. The animals from these farms, however, do not enter the market. This has created a difficult situation for consumers. Supplies of meat in the retail shops has shrunk, and prices have increased accordingly. The share of imports in consumption has risen, but border tariffs remain high (60 percent for poultry, for example), contributing to the high retail prices.

Table 5--Status of state pork and poultry complexes in Romania, December 1997

	Pork	Poultry
	Numbers	
Total companies	50	60
Privatized	5	9
Advanced stage of privatization	2	0
Different stages of privatization	25	36
In the process of liquidation	4	11
Depopulated	14	4

Source: Piata Carnii: Bovine, Porcine, Pasari, Institute of Agrarian Economics, World Economy Institute, Bucharest, Romania, 1998.

Teaching Supply and Demand in a Transition Economy

Over the last 7 years ERS has provided technical assistance in several of the CEE and NIS countries. The core of the ERS program has been to teach counterparts in these countries to prepare commodity market reports that analyze the factors affecting supply and demand for specific commodity markets and provide a short term forecast. One of the biggest challenges has been to convey an understanding of the role of prices in balancing supply and demand for a commodity.

During the communist period prices of inputs and outputs were fixed, and production targets were set by the central planners. Production often fell short of the targets, and because of low prices set by the governments, output almost always failed to satisfy consumer demand. One could almost say the prevailing rule was that "demand is greater than supply." The solution to lengthening lines in the retail shops was to exhort workers to increase output.

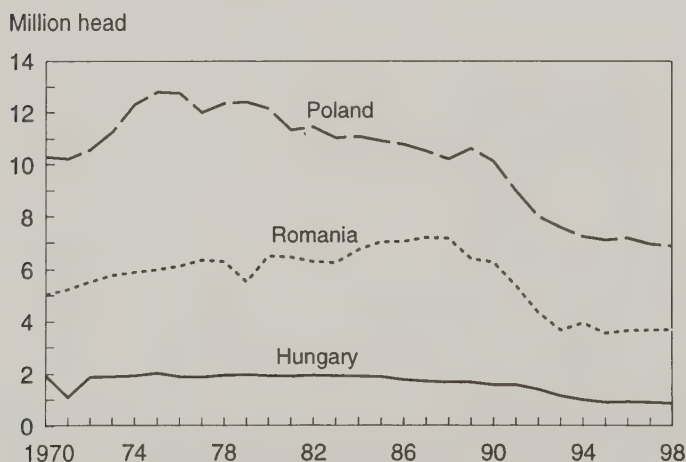
There is still a tendency among policy makers in the region to view the drops in production with alarm and to try to implement measures intended to "stimulate production." The authors of the commodity reports are greatly tempted to use the reports as vehicles for giving advice to producers. But their goal is not to tell producers how to increase profits, but how to increase output. They criticize the producers for not following the proper technologies. The authors understand that producers are responding rationally to changes in relative prices when they use their own seeds instead of hybrid seeds, fail to apply the optimal mix of fertilizers, or engage in direct grain feeding of livestock. But at the same time they condemn such practices as a failure in farm management.

Although they fully understand that producers have adjusted their cultivation practices to minimize their costs, analysts continue to calculate "normative costs of production." They use a set of technological norms that specify the optimal quantities of fertilizers necessary to maximize yields. They then multiply these norms by current input prices to derive the cost of production. The same analysts will then argue that the government should set a minimum price based on the normative costs plus a "normative profit."

Calculation of demand also tends to be based on rigid norms—dietary norms developed by the central planners. This thinking leads to the confusing statement in the commodity reports that "demand was not met." To an economist such a statement makes little sense in that prices are generally free, and it can be readily observed that there are no lines in the retail shops. But this reflects a fundamental difference in interpretation of the word "demand." To an economist, demand is the quantity that consumers are willing to buy at a given price. To a former central planner, demand is calculated according to nutritional norms. Because prices have risen, most consumers cannot afford to buy enough to meet these norms, leading to the conclusion that demand was not met.

Figure 7

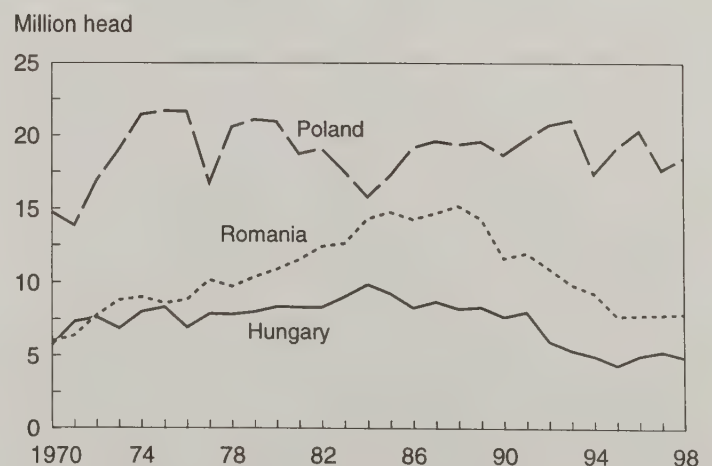
Cattle Inventories, January 1, Hungary, Poland, and Romania



Sources: Statistical yearbooks of respective countries.

Figure 8

Swine Inventories, January 1, Hungary, Poland, and Romania



Sources: Statistical yearbooks of respective countries.

The central planners thus calculated both supply and demand according to rigid norms in a way that does not allow for the substitution of goods in response to changes in relative prices. Even now, 7 years later, many policy makers have difficulty comprehending a fundamental principle of a market economy: that there is no fixed optimal mix of input use for producers or consumption for consumers. Changes in relative prices constantly change the optimal mix of inputs and the basket of consumer goods.

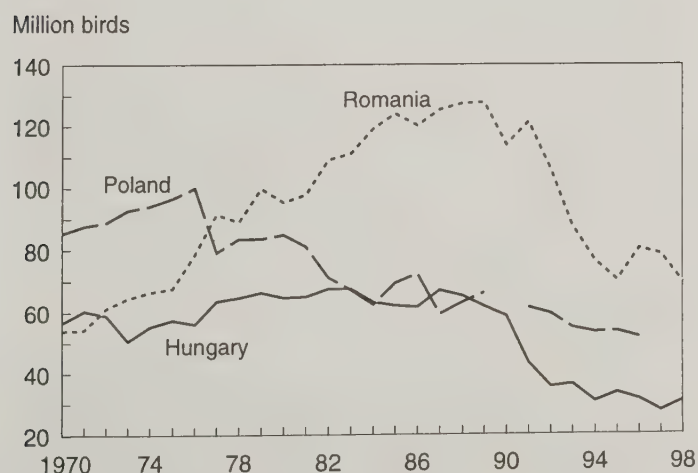
These misperceptions have led to misguided policies. With production falling and the perception that demand is not being met, policy makers conclude that they have a food security problem. One type of response can be seen in supply-side measures to "stimulate production," including minimum prices, high border tariffs, or input and credit subsidies. Such measures can distort production decisions and can slow down the restructuring process. If such measures are based on normative rather than actual costs of production, they can be even more distorting.

In addition, in many countries such measures have tended to favor the remaining state or "corporate" farms. This bias comes from the perceived need to preserve large scale farming. But this thinking reflects a very rigid view of the "optimal farm size." In fact, there is no fixed "optimal" farm size: the optimal farm size depends on the resource base of an individual country and the relative prices of land, labor, and capital. A fully functioning land market will quickly reveal the optimal farm size, but policy makers fear that an unfettered land market will lead to an undesirable farm structure.

Even more damaging are measures intended to hold down food prices for consumers. These take the form of controls on producer prices or processors' margins and export controls (taxes, quotas, or outright bans). The inevitable result is falling output, rising consumer prices, and the eventual need to import.

There is a clear need to teach the fundamental principles of economic theory. But there is a need for further debate on the most effective way to communicate these principles. We are dealing with 45 years of deep conditioning (80 years in the case of the NIS) to think in a different way. There is a deep distrust of markets and a strong reluctance to accept the risks that accompany free markets. The analysts we work with are often very well trained in mathematics and have little difficulty understanding a theoretical presentation of economic principles. But the ability to internalize such principles and apply them to everyday decision making does not automatically follow. Economics training needs to be very applied, drawing constantly on real life examples that are relevant to someone growing up in a centrally planned system. [Nancy Cochrane]

Figure 9
Poultry Inventories, January 1, Hungary, Poland, and Romania



Sources: Statistical yearbooks of respective countries.

The coming year will be a test of the extent to which Romanian producers are able to respond to market forces. Retail and wholesale meat prices are high, and feed grain prices are very low because of surplus production and difficulties with exports. Furthermore, many producers receive grain as payment in kind for land they lease to the associations. One would expect producers, particularly hog producers to respond by expanding herds. Some producers very likely will increase their herds. But many producers are far away from the major grain producing areas and transporting grain to those areas is very expensive. It is also unclear how many of the complexes will have the financial means to invest.

The Response of Producers in Poland and Hungary: Moving to the Next Stage

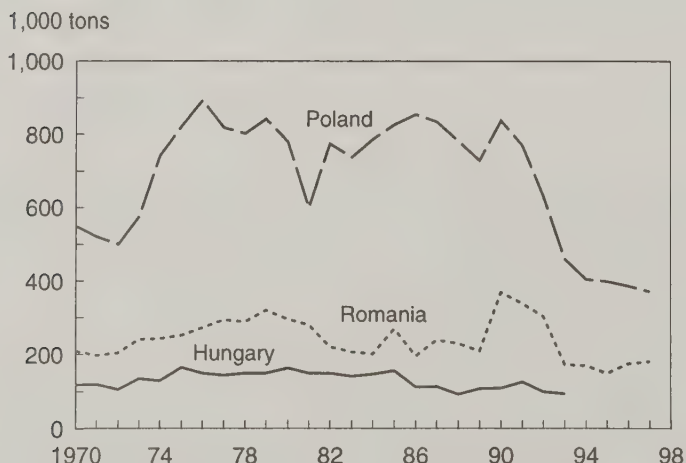
In contrast to some of their neighbors, Poland and Hungary may have seen a stop in the steady decline of hog and poultry inventories. Pork production has stabilized and poultry

output is clearly on an upward trend (figures 10-12). Only cattle numbers are still declining. In particular:

- Hog numbers have bottomed out and appear to be on an upward trend in Hungary. There was never such a clear downward trend in the Polish hog sector. Instead the sector has settled into a clearly defined hog cycle, responding rapidly to fluctuations in world grain prices. Thus, Polish hog numbers are expected to recover in 1998 from a dip in 1997 due to high feed prices, but this does not necessarily represent an upward trend. There is potential for long term expansion in both countries, but it is not yet clear just how much.
- Poultry production is booming in both countries. The sector has been able to respond rapidly to increased consumer demand. In part, this is due to the shorter production cycle, which makes it easier to increase poultry numbers rapidly. Another reason is that even before the transition, procedures for contracts between poultry processors and private producers were well established. As is the practice in western countries, processors would provide baby chicks and feed to producers and take delivery of the finished birds at a price established in advance. Producers thus had a head start in adapting to the demands of a capitalist market.
- Cattle numbers have stabilized in Hungary but are still declining in Poland. The herds are still mainly dual purpose dairy and beef, and the numbers are influenced mainly by developments in the dairy market. There has been an attempt in both countries to introduce beef cattle (Hereford-Angus), but there is not a tradition of eating high quality beef in either country and domestic demand for American-style steaks has not yet developed. Hungary has a larger herd of beef cattle than Poland, but Hungarian beef cattle are produced almost entirely for export.

Figure 10

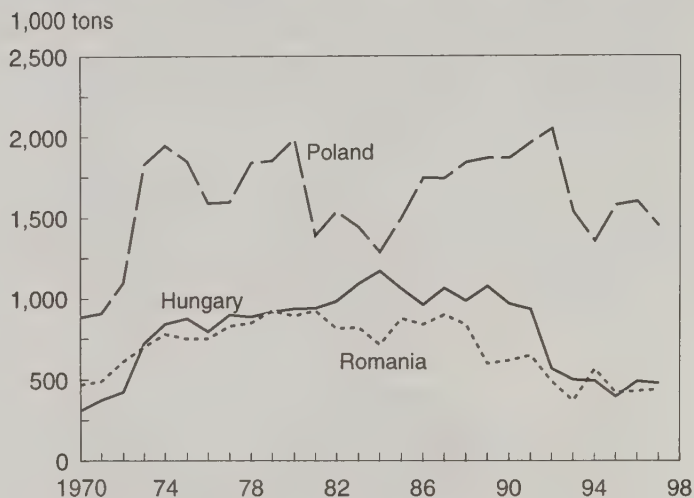
Beef and Veal Production, Hungary, Poland and Romania



Sources: Statistical yearbooks of respective countries.

Figure 11

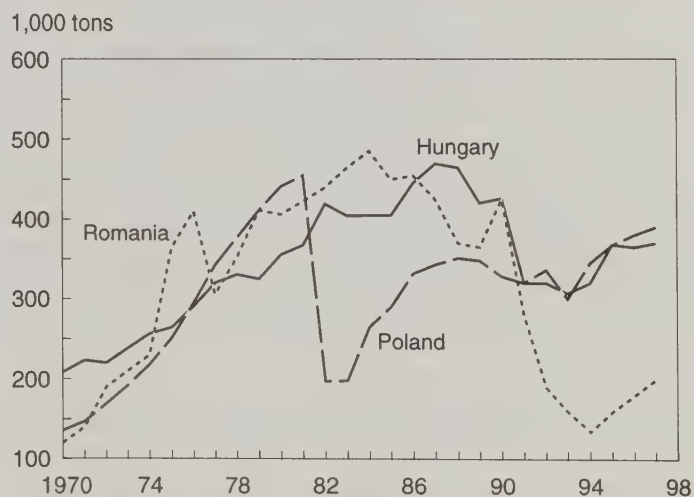
Pork Production, Hungary, Poland and Romania



Sources: Statistical yearbooks of respective countries.

Figure 12

Poultry Production, Hungary, Poland, and Romania



Sources: Statistical yearbooks of respective countries.

Significant in both countries, however, is the emergence of a significant class of commercially oriented private producers, who recognize the importance of meeting the quality standards of foreign markets. Both countries have a substantial number of producers who still produce mainly for their own consumption. But even in Poland, where the average farm size is still just 8 hectares (up from 7 in 1990), there is a growing number of producers with 50 or more animals who produce mainly for the market. In Hungary, around half the animals belong to corporate farms, many of which are foreign owned.

The result has been a trend towards higher quality feed ingredients and more efficient use of them. In both countries the ratio of kilograms of feed to kilograms of live weight gain for poultry is around 2 to 1; the ratio for hogs is close to

3 to 1. The improvement has been particularly impressive in Poland, where feed ratios of 6 to 1 were quite typical for hogs in 1989. Polish farmers have almost entirely abandoned the practice of feeding potatoes, replacing them with grains. Preparing potatoes for use as feed is regarded as very labor intensive, and apparently the value of labor has increased to the point where this is not regarded as economic. Only the very smallest two-hog farms still feed potatoes.

In both countries the commercially oriented producers have reacted quickly to changing demands of foreign markets. For example, Hungary exported huge numbers of live pigs to Western Europe in response to demand for feeder pigs in France and Germany and an outbreak of hog cholera in the Netherlands. Hungary has developed entire subsectors, among them beef cattle and turkey, specifically for export to the west. In Poland, several processing plants have developed lines for production of low quality sausage specifically for export to the NIS. Poles have also been importing mechanically deboned meat, which is prohibited on the domestic markets, for reexport to the NIS.

Response of the Downstream Sector

The removal of subsidies and exposure to world competition also had a strong impact on the meat processing sector in the transition economies. At the beginning of the transition, the processing industry was dominated by state owned packing plants. These tended to be inefficient and technologically outdated. In many cases they were too large and not conveniently located, resulting in high costs. Because of the fall in consumer demand, they began to work below capacity, raising per unit costs still higher. Facing competitive world prices, they were unable to raise prices to cover their costs. Instead they sought to maintain profits by using whatever market power they had to limit producer prices.

The initial response was privatization from below, with the start up of new, small-scale firms. In marked contrast to the trend in many market countries towards the concentration of production units, the restructuring resulted in the downsizing of operations and the development of small-scale production by many units. These newly private firms have presented increasing amounts of competition both in the purchase of raw materials and the retail market. But purchases of domestic production by these firms is hampered by poor transportation and the difficulty of arranging deliveries from a large number of small producers. Lack of sufficient refrigerated storage also makes it difficult for these firms to buy large quantities.

Low producer prices and delays in payment forced livestock producers increasingly to market or barter meat directly to consumers. Direct marketing from producer to consumer is evidence of market reforms, as producers pursue alternative marketing channels in place of selling output solely to former state processing enterprises. On the other hand, it

results in low efficiency in the meat sector, higher production costs and prices, and non-standardized meat products of a fluctuating quality.

Very little of the private sector production in Russia, Romania, and Ukraine ever enters the market. Even in Poland and Hungary, where the share of marketed output by private producers is significant, there remains a large segment of production that is either consumed on farm or sold to small-scale slaughterhouses that do not meet standards for export and mainly serve the low end of the domestic market.

A major challenge for Russia, Ukraine, and Romania has been eliminating the direct state role in the marketing system and reorienting it to a role of supporting the development of market infrastructure. Abolishing state commodity procurement has come slowly to Russia, and even more slowly to Ukraine. Romania's parastatal agency, Rom Cereal, which provided free or subsidized inputs and served as the sole buyer of grain, was broken up only in late 1995. Through the creation and subsequent reorganizations of the Federal Food Corporation, Russia has made repeated attempts to limit state procurement programs. Official Russian statistics, however, continue to refer to purchases by regional meat processing plants as state procurement.

With privatization, many of the former state processing plants in Russia became private monopsonies, as livestock producers had few alternatives to selling to these "new" enterprises. Producers have increasingly bypassed processors by selling directly on the open market. Many Russian meat processing operations located near the large urban markets of Moscow and St. Petersburg actually prefer importing meat to maintain processing capacity over contracting for domestic meat.

Poland and Hungary have made substantially more progress towards privatizing the processing sector. The processing industry in Hungary is 100 percent privatized (thanks largely to foreign investment). The Polish meat processing industry only about 60 percent privatized. However, even in companies where the state retains a share, managers are under pressure to keep the companies afloat without support from the state treasury. Failing plants are allowed to go bankrupt; they are not bailed out with soft loans.

In all the transition economies marketing margins have risen substantially. Both consumers and policy makers, dismayed by the rapid rise in food prices while farmgate prices have fallen, tend to blame the phenomenon on continued monopoly power of the downstream enterprises. But the situation is more complicated. In part the rise in margins is simply the result of the removal of subsidies. In some cases, it is also due to true value added (the quality and appearance of Polish processed foods has improved markedly since 1989, adding to the cost of the final product). But the rise in mar-

gins is also the result of high transactions costs. Plants operate under capacity, which raises per unit costs. Transportation and storage facilities are inadequate. Another source of increased transactions costs is risk. Decision making is hampered by poor market information, the lack of uniform quality standards increases risk, and enforcement of contracts is minimal.

These bottlenecks in the distribution sector explain the apparent anomaly that processors may tend to import raw livestock product that is more expensive than domestic production. The transactions cost of buying domestic production can wipe out the savings that might result from buying cheaper meat. In addition, uneven quality and unreliable delivery of domestic output make imports more attractive.

The Role of Policy Reforms and Institutional Reforms in the Restructuring of Livestock Sectors

At the root of the differing degrees of restructuring in the transition economies are fundamental differences in the paths that the countries have chosen towards market reform. The factors influencing the restructuring process fall into two general categories: policy reforms and institutional reforms.

The Role of Policy Reforms

Macroeconomic stability has largely been achieved in Hungary and Poland. Inflation is down almost to single digits in both countries, the currencies are internally convertible at relatively stable exchange rates, and interest rates are declining. The macroeconomic climate is thus much more conducive to long range planning and investment. In addition, stability makes these countries more attractive to foreign investment.

Romania, Russia, and Ukraine, have now achieved a degree of macroeconomic stability similar to Poland or Hungary, but the approach was more gradual, and the prolongation of the process has slowed the restructuring. The three countries were initially reluctant to implement measures likely to cause political or social fallout. Russia and Ukraine have now reduced their inflation to less than 20 percent, but this was achieved 4 or 5 years after Poland and Hungary reached this point. True restructuring cannot take place until some degree of macroeconomic stability is achieved. An environment of high inflation and extreme price volatility is too risky to attract investment needed to restructure livestock enterprises.

Price and trade liberalization. Russia, Ukraine, and Romania also took a more gradual approach to price and trade liberalization. In Poland and Hungary, the governments took bold initiatives from the beginning of their transitions to reduce state support and to liberalize prices. The result was that input and output prices quickly settled at the world level. The adjustment for livestock producers in

Russia, Ukraine, and Romania has been more difficult because these countries maintained price controls on meat and meat products much longer than in Poland and Hungary. In an attempt to protect the consumer and maintain consumption levels of meat, these governments, in effect, pursued policies that served to prolong the price-cost squeeze on producers.

While liberalization of foreign trade was an early part of reforms in all NIS and CEE countries, the rapid influx of Western food products at competitive prices generated protectionist tendencies. Although Poland and Hungary have recently implemented more protectionist policies, these policies are disciplined under the WTO and are relatively transparent. In Russia and Ukraine, however, claims of weakening food security were heard from the start of the transition and this mind-set continues to justify government intervention. Only recently have the livestock sectors in these countries begun to feel the need to adjust to real market conditions.

Prospects for EU integration. The prospect of eventual EU accession increasingly dictates agricultural policies in Hungary and Poland and has encouraged the livestock sectors to take positive steps toward market integration. Processing plants are being encouraged to upgrade so that they can meet EU standards. Various measures are being taken to induce producers to grow leaner hogs. Hogs in both countries are rapidly approaching 60 percent lean content. Polish plants that produce more than 250 kg of pork per week must have equipment to measure the fat content precisely and are required to pay a premium for high lean yield over 60 percent and a discount for lean content under 60 percent.

Hungary provides a variety of subsidies and price supports to encourage plants to raise their lean yield standards. The system of guaranteed prices has been replaced by a set of target prices. But this support only applies for hogs slaughtered at plants applying EU standards. In addition, any Hungarian producer who trades in an ordinary sow for a pedigreed animal can receive a subsidy of 30 percent of the value of the new sow. But he must be a member of the Breeders Association and he must use boars or semen provided by the Association. This subsidy is not attractive for small producers, since these high quality animals must be raised in good conditions, which raises production costs.

Poland's intervention in the meat market is much less pervasive than Hungary's. But like Hungary, much of Polish support to livestock producers is intended to encourage the development of larger units that will be able to produce according to EU standards. Poland's Agency for Agricultural Markets (AMA) carries out intervention purchasing of hogs, but plants authorized to purchase on behalf of the AMA must be licenced to export and must meet EU standards. Furthermore, all carcasses that are purchased must meet the EUROP standard.

But the price and trade policies pursued by Hungary and Poland have disadvantages. In response to pressure from producers damaged by trade liberalization of 1990, the Polish and Hungarian governments have implemented increasingly interventionist price and trade policies. These include high import tariffs, guaranteed minimum prices supported through intervention purchasing and export subsidies, and a variety of credit subsidies. In one sense, it is a sign of success that producers have responded to many of the incentives provided by their governments. On the other hand, these policies, particularly in the case of Hungary, seriously distort production decisions and incur high budget costs.

The Role of Institutional Reforms

A major impediment to domestic and foreign investment in the region's livestock sector is the lack of the institutional infrastructure needed to support the development of markets. The necessary institutions include clearly defined property rights, bankruptcy procedures, enforcement of contracts, a credit system, and market infrastructure. These institutions are better developed in Poland and Hungary than in the other countries, but are not fully developed even there. The lack of such institutions greatly inhibits the free movement of factors of production and slows the transition from a sector dominated by subsistence farming to a truly commercial livestock sector. Even where relative prices might favor expansion of a given species, producers are often unable to respond to those signals because of a lack of institutional support.

Enterprise privatization. In Poland and Hungary, production and processing are mostly privately owned and managed. Because Poland has a long tradition of private agriculture and private land, the privatization of state enterprises was adopted quickly and easily. Hungary very quickly privatized all agricultural land and transformed the cooperative farms into various types of corporate farms. These units, in contrast to those in the other three countries, are truly free of state control and must operate on a hard budget constraint. In Russia, Ukraine, and Romania the privatization and restructuring of farms and other agribusinesses remain well behind that in Poland and Hungary.

A significant share of state ownership in the production and processing of livestock and other products inhibits the options of private producers in several ways, which have been noted above. State production units tend to receive a disproportionate share of state subsidies, giving them an advantage over private producers. State dominance of marketing channels limits marketing options and thereby tends to depress producer prices and leads to direct marketing. State ownership of grain storage and feed mills also raises production costs for private producers.

Much of the success in Poland and Hungary can be attributed to a relatively well-defined legal structure surrounding

privatization in these countries. Property rights and bankruptcy procedures are clearly defined in Poland and Hungary, in sharp contrast to Russia, Ukraine, and Romania. A failing meat processing plant is allowed to go bankrupt in Poland and Hungary, for instance, whereas in Russia or Ukraine the plant would most likely be supported with soft loans and inputs. Around 75 percent of all former state farms in Russia are unprofitable and nearly all livestock enterprises continue to operate in the red.

In 1998, Russia is expected to put in place a legal mechanism for financially unviable farms to declare bankruptcy. But it remains to be seen if Russia's government has the will to enforce this legislation. Romania, which passed bankruptcy legislation in 1991, has yet to implement a strong enforcement mechanism.

The privatization process has been hindered by an overvaluation of the enterprise assets that in effect dissuades potential buyers, both domestic and foreign. Technologically outdated plants can be attractive to investors if priced low enough. Only Poland, the Czech Republic, and Hungary have moved substantially to allow the market to "price" fixed plant and equipment. Some assets will be liquidated while others will be salvaged or renovated. Excess unpriced capacity also inhibits investment in new plant and equipment because the value of existing assets is unknown.

A somewhat different type of constraint exists in Romania, where the Ministry of Privatization strongly discourages potential investors from purchasing just part of an existing enterprise. Many of Romania's enterprises are vertically integrated, and an investor who just wants to buy the slaughterhouse, but not the production unit or network of retail shops, is discouraged.

Another serious impediment to farm privatization is the need to decouple social and other services provided by farms and reassign these functions to municipal governments. These services are expensive to provide and act as a severe drain on potential profits. Few potential investors want to take on such obligations.

Development of Land Markets. The development of functioning land markets is also critical to functioning agricultural markets. Poorly functioning land markets prevent the movement of land to its most efficient use. The lack of a land market also hampers the mobility of labor and other resources. In Ukraine, for example, an individual owning a plot of land has little opportunity to sell or lease the plot and move into a more profitable or desirable profession. Hence, labor remains tied to the land. In many of the countries, land owners still do not hold title to their plots, so the land cannot be used as collateral for needed agricultural loans.

In Poland, land is privately owned with clear titles, and there are no legal restrictions on sales or lease. Yet in prac-

tice the land sale market is extremely thin. There is not much demand for land because agriculture still is not considered profitable. At the same time, owners of land remain reluctant to sell because of a lack of employment opportunities outside agriculture. And the lack of market information and a network of real estate brokers makes it difficult for those who are interested in buying or selling land to find each other. There is also very little credit available for land purchases.

In Hungary, only individuals may own land; restructured cooperatives and commercial companies can only lease land. Hungary's land restitution process led to the development of very small and very large farms—there are no medium size units—and this situation has changed little since 1992.

Land markets are completely lacking in Russia and Ukraine. While members of the former collective and state farms received rights to shares of land, the absence of titles impedes their ability to take a plot of land and to farm it privately, or to sell or lease it. While private family farms grew rapidly during the early 1990s when new laws were passed, they currently comprise only around 5 percent of agricultural land, and only account for 2-4 percent of livestock output in Russia and Ukraine.

Similarly in Romania, although the land is privately owned, nearly half of the land owners have yet to receive the legal title to it. And while 80 percent of agricultural land is privately owned, there remains a 5-year moratorium on the sale of agricultural land. Because the members of the former collective and state farms in Russia, Ukraine, and Romania received their rights to plots of land free of charge, there is even less of an incentive to use it efficiently. The land adopts a negative or zero value, and farmers tend to overuse and abuse the land without consequence.

The most obvious consequence of the lack of a functioning land market is the failure to develop economies of scale. Even if prices encouraged the expansion of a herd, expansion is difficult if the producer cannot acquire additional land. This has led to the preponderance of subsistence farming. Even Poland's small private farms, averaging around 8 hectares, have not evolved into larger, consolidated units. For example, 63 percent of Poland's 1 million hog farms have less than 20 hogs and account for 14 percent of total numbers. Of the 1.4 million cattle farms in Poland, only 2 percent have more than 20 head. These 2 percent account for 21 percent of cattle.

In countries where titles and ownership rights are not clarified, even more serious problems arise. Producers will not care for land they do not own. In several of the countries, cattle are grazed on communal land, leading to overgrazing and soil erosion.

Market Infrastructure. The market infrastructure (transportation, storage and handling facilities, processing and retail

networks, communications, and market information) inherited from formerly command economies was heavily centralized and designed to meet the state's needs. It is entirely inadequate for smoothly functioning markets.

There have been significant improvements in the physical infrastructure in Poland and Hungary. Highways have been upgraded, public transportation has improved, and telephone communications are more reliable. This improvement was made possible largely through foreign investment and technical assistance. The improved infrastructure has reduced transaction costs and has helped to attract foreign investment.

Russia, Romania, and Ukraine, however, have seen very little investment in market infrastructure. In Russia and Ukraine, transport services are centered around railroads, and limited highways are deteriorating. It is estimated that Russian transportation costs from farmgate to consumer are 20-40 percent of the costs of production. Because the existing market structures are geared toward serving large cooperative and state farms, emerging private producers face severe infrastructural limitations. Private producers increasingly bypass normal marketing channels and sell their products directly to the customer.

Market information—broadly disseminated reports of daily prices on different markets—is essential to the efficient movement of goods from a surplus to a deficit region of the country. Market news reporting is now well developed in Poland and Hungary and is improving in Russia, but reporting remains at best rudimentary in the other two countries. In Romania, the EU PHARE Program spent a considerable sum of money to develop a network for price reporting. But the Ministry of Agriculture keeps the information for its own internal use and does not disseminate it. Large producers—state and private—have their sources of information, but the lack of widely available market information is a severe handicap to small, private producers. Low cost, publicly available information would help level the playing field, so that small producers can compete.

Labor Laws and the Social Safety Net. Institutions and laws must be established to address new labor and other social problems that arise from adjustments in the farm workforce. Redefinition of health and social security programs, the establishment of job retraining services, and the development of market-based management and economics programs in the educational system are vital parts of the transition.

Labor mobility in all the countries is hampered by housing shortages and a mismatch of skills. There is a strong demand for well-trained technical workers in the cities, but with the closure of many basic manufacturing enterprises, there is little demand for low skilled labor that might want to leave the farm. This impedes efficient resource allocation and the consolidation of farms.

Future Directions for Research

ERS is currently constructing a modeling framework to answer questions posed in this paper: How changes in output prices, input prices, subsidies, wage policies, and investment affect the livestock sectors in transition economies.

The purpose of this modeling exercise is to develop a theoretically consistent framework for each country's meat production (including the entire sector from production to retailing) and non-agricultural sectors, with explicit inclusion of factor (land, labor, and capital) markets. The primary modeling objective is to be able to simulate varying degrees of factor mobility, in order to measure medium and long-term structural implications for meat production in transitional economies.

A comparison of scenario results with a base solution will allow calculation of the following:

- changes in equilibrium quantities of livestock and poultry production (cattle, hogs, poultry, eggs, and milk), and processing (beef, pork, and dairy products), and consumption;
- changes in net trade position for meats (beef, pork, poultry), eggs, and dairy products;
- changes in factor intensities within livestock production and processing industries, and between meat production and non-agricultural sectors.

Thus, for a given market scenario, model results will tell us whether production of a given species (cattle, hogs, poultry, dairy) is growing or declining, and whether the production is being processed or traded live. Changes in factor intensities of livestock/poultry production and processing will provide insight into whether or not, for example, hog production is more, or less, land, (or labor, or capital) intensive. Thus, an increase in the land-to-labor ratio for hog production would suggest that hog production operations were getting bigger, and more labor efficient. Changes in capital stocks accumulation will indicate directions of investment, both within the meat production sector, between agricultural and non-agricultural sectors of a given country, and between the given country and the rest of the world. Increasing stocks indicate expected high relative returns and positive structural development.

As long as social welfare functions remain tied to the state farms, workers will be reluctant to leave the collective to start a private farm. They not only face increased risk and difficulties acquiring inputs and marketing output, but they may lose access to health care, pension rights, and even housing.

Credit. A market-oriented rural finance system is essential for the successful restructuring and privatization of livestock farming in all the transition economies. For example, a hog producer may believe that changes in relative prices of hogs and feed would make it profitable to expand his operation. But producers rarely have enough cash to purchase additional animals or feed, let alone invest in a new barn or small feed mill. Without access to long and short term credit, many producers will not be able to respond rationally to changes in the market.

Despite several experiments in Russia to offer farm credits more efficiently, an effective short-term commercial credit system is still lacking. Ukraine remains even further behind. Romania still lacks a developed private and competitive banking sector.

In Ukraine, credit to the agricultural sector in the past 2 years has been allocated mainly through advances the government provides through procurement contracts. The government, in effect, offered zero interest budgetary loans. Because of the financial insolvency of the state, however, payments were made only after significant delays. It was even more common for the state to pay in-kind, causing additional distortions in resource distribution.

Another major obstacle to credit operations in Russia, Ukraine, and Romania is that because land cannot be used as collateral, farms must rely on commodity output or physical capital and equipment for guaranteeing loans. And because many farm operations are unprofitable and banks have little interest in foreclosing on obsolete farm equipment, little credit is extended on a short-term commercial basis.

Rule of Law. Russia, Ukraine, and Romania lag significantly behind Poland and Hungary in the development of a market-based legal framework. These countries still have the mindset that middlemen, who trade rather than produce, are "parasites." Widespread corruption and the ever present "mafia" still impede commerce in many cases. The inconsistent application of the law and the random enforcement of penalties

continue to undermine business transactions, as does the ad hoc recognition of property rights by regional governments. Such conditions greatly increase the risk of investment.

Looking to the Future

For countries such as Romania, Ukraine, and Russia, it remains an open question whether their governments will make real progress in removing the institutional obstacles to the full restructuring of the livestock sectors. If they do, and there begins to be free movement of land, labor and capital, the coming decade should see the consolidation of household plots into commercially viable farms and emergence of a class of true corporate farms operating on a hard budget constraint. Only under these conditions can we know whether these countries have the potential to become net exporters of livestock products.

But an equally realistic scenario is one in which there is little progress in institutional reform. Under such a scenario,

livestock could continue to be divided among small subsistence farms and inefficient, quasi-privatized corporate farms. In this case there will likely be further declines in livestock inventories in the short term, as governments find themselves unable to subsidize state farms at the current level. But eventually the declines will halt, and these countries could exist for several years at a low level equilibrium.

Future developments in Hungary and Poland will be increasingly dictated by their progress towards EU accession. Completion of institutional reform will be a prerequisite for membership, and the principal question is *when* rather than *whether* these reforms will be complete. Thus the questions of interest are the future net trade position of these countries and changes in factor intensities within livestock production and processing industries, and between meat production and non-agricultural sectors.

Russian and Ukrainian Agriculture and Trade Outlook to 2005

USDA forecasts that in the long run Russia will remain a major importer of meat, but only a small net importer of grain. By the middle of the next decade, Russian meat imports are projected at about 2.5 million tons annually, almost half being poultry meat. Annual net imports of grain are forecast to be about 2.5 million tons, the bulk being wheat. Ukraine is projected to be a small meat exporter, and a somewhat larger exporter of grain. [William Liefert and David Sedik]

This article forecasts Russian and Ukrainian agricultural production and trade to the year 2005, specifically for meat and grain. The projections are from an ERS model of the world agricultural economy, the Country-Link System, which generates forecasts for agricultural production, consumption, and trade. The Country-Link System consists of 46 individual country or regional models, all of which are partial equilibrium and dynamic in nature, covering 22 commodities.

Forecast Assumptions

The main assumptions behind the forecasts are: (1) after a couple more years of little or no growth, real GDP in Russia and Ukraine begins to grow at about 3 percent annually during 2000-2005; (2) productivity growth in the livestock sector is modest; for example, from 1997 to 2005 grain feeding efficiency rises 15 percent (which means by 2005 feed efficiency will still be 10 percent worse than in 1990, because of the large decline from 1990 to the present); (3) area for most grains falls about 5 percent; (4) yields in the grain sector increase over the projection period about 5 percent (total, not annually), though to less than pre-reform levels; and (5) commodity-specific trade policies remain unchanged, which means import tariffs continue at current levels, and no import quotas are established.

According to official statistics, in 1997 real GDP in Russia rose for the first time since reform began (by 0.4 percent), while Ukraine's GDP fell only 3.2 percent, compared to drops of 10 percent or more in all previous reform years. This performance supports the assumption that by 2000 real GDP in both countries will be growing about 3 percent annually, particularly given that the official macroeconomic figures probably still fail to capture some new private enterprise.

The assumed levels of growth in productivity in the livestock and crop sectors rest on the supposition that the extreme worsening in farms' terms of trade over the reform period and declining state subsidies will motivate farms to use inputs more productively. Crop producers have already begun to use inputs more efficiently, as shown by the fact that production has declined much less than input use. In addition to worsening terms of trade, crop producers have

had to adjust to a severe reduction in subsidies. Although livestock producers have so far not shown much improvement in productivity, the decline in feed efficiency has ended (at least in Russia). Subsidies to livestock producers, though still larger than for crop producers, continue to drop. Tightening budget constraints should eventually motivate livestock producers to use inputs more efficiently.

However, given the huge potential for agricultural productivity growth in Russia and Ukraine, as indicated by the large productivity gap between these countries and the developed West, the assumed growth in Russian and Ukrainian productivity to 2005 is modest. The growth is expected to result mainly from farms using inputs more efficiently because of their worsening financial condition, but without any substantial change in the way production is organized and managed. Major productivity growth requires institutional reform (involving such matters as land reform and privatization) that would more fundamentally improve producers' incentives to use inputs more productively. Such reform in Russia and Ukraine has so far been slight, and evidence does not suggest that major reform will be attempted soon. In both countries agriculture remains dominated by the former state and collective farms, which have done little since reform began to change their organization, management, and work incentive systems.

The absence of land markets in particular has hurt Russian and Ukrainian agriculture, in three ways. First, without land markets, land is a (nearly) free good for managers. Thus, it is overused in farming, as cultivation is pushed to low-yielding marginal land. Second, without land markets, land, which should be a farm's primary asset, cannot function as collateral for loans to fund capital investment. Third, land is not only virtually free for farms, but also inalienable. Because farms do not risk losing their land, regardless of how unprofitable they might be, management can pursue objectives other than productivity-raising cost minimization or profit-maximization (such as rent seeking or maintaining worker employment).

ERS assumes that grain area continues its gradual fall, as the overexpansion of production to marginal land during the Soviet period continues to be corrected. However, crop area

remains higher than it would be if well-functioning land markets were created.

Although trade controls in Russia and Ukraine could increase somewhat in the near term, over the next 5-8 years trade policy in the two countries is likely to become only marginally more protectionist. Current policy is not overly restrictive. Import tariffs for most agricultural products range from 10 to 30 percent, and few quantitative restrictions exist.

Pressure is growing in both countries to increase protection for agriculture, such that in 1998 trade restrictions could increase a bit. One reason is that in the last few years the currencies of both countries have appreciated substantially in real terms, which makes imports cheaper relative to domestic output. Russia is also upset about what it perceives as unfair anti-dumping actions taken against itself by various countries (mainly the European Union), and might retaliate.

Yet, there are two countervailing reasons why in the longer term Russia and Ukraine are unlikely to adopt agricultural trade policies that are strongly protectionist. The first is that they have a large interest in joining the World Trade Organization, with Russia well along in the accession process. If the countries become members, they will have access to institutional mechanisms, from dispute settlement to clear rules on safeguards and anti-dumping measures, with which to address their trade concerns. The second reason is that anti-protection consumer interests remain strong, particularly in Russia. Urban politicians, such as Moscow's mayor Luzhkov, continue to defend the interests of their food-consuming constituents.

The modeling assumption that trade policies in Russia and Ukraine remain unchanged over the projection period therefore appears generally valid, given that any increase in protection is likely to be marginal, and the forecasts are not overly sensitive to small increases in trade restrictions.

Forecast Results

The assumed rise in real GDP over the projection period increases consumer demand, and therefore consumption, for meat (as indicated in tables 6 and 7 by summing production and net trade in 2005). The anticipated productivity growth in Russian livestock operations allows domestic producers to satisfy much of the increased demand for meat, as meat output expands to 5.5 million tons by 2005. However, some of the increased demand is met by rising imports, which by 2005 equal 2.5 million tons. This indicates that Russian productivity growth will be insufficient to make the country competitive in meat production vis-a-vis the world market. In other words, Russia's comparative disadvantage in meat production will continue, due to high costs of primary production and processing. Almost half of Russia's meat imports will be poultry meat. In Ukraine, all the increased

Table 6--Production and trade for meat and grain, Russia 1/

	1987-91	1995	1996	2005
	1,000 tons			
Meat 2/				
Production 3/	9,763	5,719	5,210	5,503
Net imports	1,408	1,943	2,038	2,501
Poultry				
Production	1,774	859	765	895
Net imports	100	865	945	1,159
Grain				
Production 4/	94,780	60,800	66,700	71,844
Net imports	21,266	4,750	1,050	2,451
Wheat				
Production	41,846	30,100	34,900	38,308
Net imports	10,736	4,100	1,150	1,471
Coarse grains 5/				
Production	52,933	30,700	31,800	33,536
Net imports	10,530	650	6/ -100	980

1/ For grains, year is marketing year (July of given year to June of following year). Figures for 1987-91 are average annual values, except for meat and poultry meat imports, which are for 1991.

2/ Includes beef, pork, poultry, mutton, and goat.

3/ Carcass weight.

4/ Cleanweight.

5/ Includes barley, corn, millet, oats, and rye.

6/ Net exports.

Source: For both historical and projection figures, ERS/USDA.

Table 7--Production and trade for meat and grain, Ukraine 1/

	1987-91	1995	1996	2005
	1,000 tons			
Meat 2/				
Production 3/	3,993	2,294	2,057	2,213
Net exports	225	190	175	112
Grain				
Production 4/	43,374	31,880	23,040	35,577
Net exports	137	1,340	500	2,538
Wheat				
Production	24,059	16,273	13,500	20,272
Net exports	229	1,090	300	1,775
Coarse grains 5/				
Production	19,315	15,607	9,540	15,305
Net exports	6/ -92	250	200	763

1/ For grains, year is marketing year (July of given year to June of following year). Figures for 1987-91 are average annual values, except for meat and poultry meat exports, which are for 1991.

2/ Includes beef, pork, poultry, mutton, and goat.

3/ Carcass weight.

4/ Cleanweight.

5/ Includes barley, corn, millet, oats, and rye.

6/ Net imports.

Source: For both historical and projection figures, ERS/USDA.

consumption of meat is satisfied by additional domestic output, as indicated by the unchanging meat trade balance (low exports continue).

Production of grain in Russia and Ukraine rises modestly over the projection period (compared to output in 1995-96). Although Russian meat production is forecast to increase about 15 percent, this does not stimulate more demand for feed grain, given our assumption that Russian feed grain efficiency improves 15 percent over the projection period. The assumed drop in area of about 5 percent also offsets the assumed rise in yields of 5 percent.

By 2005 Russia is forecast to import about 2.5 million tons of grain (mainly food wheat), while Ukraine is projected to export this amount. Contrary to predictions by certain Western observers at the beginning of reform, Russia is not projected to become a net grain exporter. Most of Ukraine's grain exports should go to Russia and other NIS countries.

The tables indicate that forecast changes in Russian and Ukrainian agricultural production, consumption, and trade over the projection period are much more modest than the changes that have occurred from the beginning of reform to the present. Reform policies have already caused substantial restructuring by generating major changes in the two main elements that influence producers' and consumers' decisions to produce, buy, and sell goods: prices and consumer income. Price liberalization fundamentally changed prices by having them move to reflect real costs of production, while integration into the world economy caused domestic prices to move toward world market levels. Price liberalization also reduced consumers' real income, as prices rose by a greater percentage than wages and salaries.

In Russia and Ukraine, price and trade liberalization began sufficiently long ago (the early 1990s) that real prices and

incomes are now stabilizing. Consumers' real income has generally stopped falling, while agricultural producers' terms of trade are no longer deteriorating, and for some Russian producers are even improving.

With the fundamental reform-induced restructuring caused by changing prices and declining real incomes now playing itself out, future changes in Russian and Ukrainian agricultural production and trade will have to come from two other main developments: (1) growth in GDP, which by raising consumer income would increase demand for foodstuffs; and (2) productivity growth in agriculture, which would improve competitiveness by lowering production and distribution costs. By 2000 both countries should be growing in real terms. The increase in consumer demand from rising GDP should expand consumption and imports of foodstuffs (or reduce exports if the country is a net exporter of the good in question), but not stimulate much additional production. Output would not rise significantly because the countries are generally free trading: any growth in domestic demand can be easily satisfied by increased imports at the existing world price. Domestic producers would expand production to meet the additional demand only if they were paid higher prices to cover their rising costs of production.

In the absence of increased trade protection, domestic producers can increase output only through competitiveness-enhancing productivity growth. The poor outlook for institutional reform in agriculture (particularly at the farm level) weakens the prospects for high productivity growth. Although Russian and Ukrainian agricultural interests continue to lobby strongly for greater import restrictions, over the long term they will probably have only limited success in changing trade policy. If so, Russian imports of meat should not only remain high, but spurred by rising incomes, continue to grow.

Agricultural Enterprise Restructuring and Land Reform in Russia, 1991-95: An Efficiency Analysis

Most major producing regions were relatively efficient before economic restructuring began on Russia's corporate farms, and most have maintained this status. However, several inefficient regions have become even more inefficient. The variation in efficiency can be explained by economic and institutional factors, including shocks in relative prices, average farm size, state marketing channels, degree of privatization, subsidy levels, and movement towards crop specialization. [David Sedik, Michael Trueblood, and Carlos Arnade]

The economic transition in the agricultural sectors of the New Independent States and Eastern Europe has two ongoing, distinct processes. The first is the transformation of the economic policy environment in which agricultural enterprises function. Policy changes under the transition include price liberalization, the opening of the economy to foreign trade, the establishment of a legal system capable of enforcing contracts, and the partial elimination of subsidies and restrictions on private production. These changes give farms incentives to reallocate resources toward a pattern more consistent with consumer demand and unsubsidized costs of production. The second process is the transformation of the farms themselves, so they can survive within this new market environment. The two phenomena associated with this producer transition are the growth of private sector output (on private farms and plots) and the restructuring of former state and collective farms (hereafter referred to as corporate farms).

Previous studies of agricultural enterprise restructuring in Russia have relied on farm-level survey data in five provinces (oblasts). The studies' conclusions can be summarized as follows:

- Most farms (95 percent) have complied formally with the decrees mandating reorganization into shareholding (corporate) farms and divestiture of state-owned land;
- Most shareholding farms are managed internally like collective farms of the past, but with more administrative autonomy and less financial security;
- Markets for commercial agricultural land have yet to develop. Neither legislators nor farm managers and employees see much usefulness in allowing land markets that might facilitate borrowing (with land as collateral), investing, and modernizing.

In this article, we summarize the results of a forthcoming ERS study in which we estimate and explain patterns in technical efficiency of crop production on large corporate farms in Russia. By technical efficiency, we mean the physical relationship between inputs and outputs. We are only able to gauge efficiency of corporate farms in the oblasts

within Russia and their efficiency *relative to each other*, and not to global standards of efficiency (for a discussion of methodology, see box, "Measuring and Explaining Efficiency").

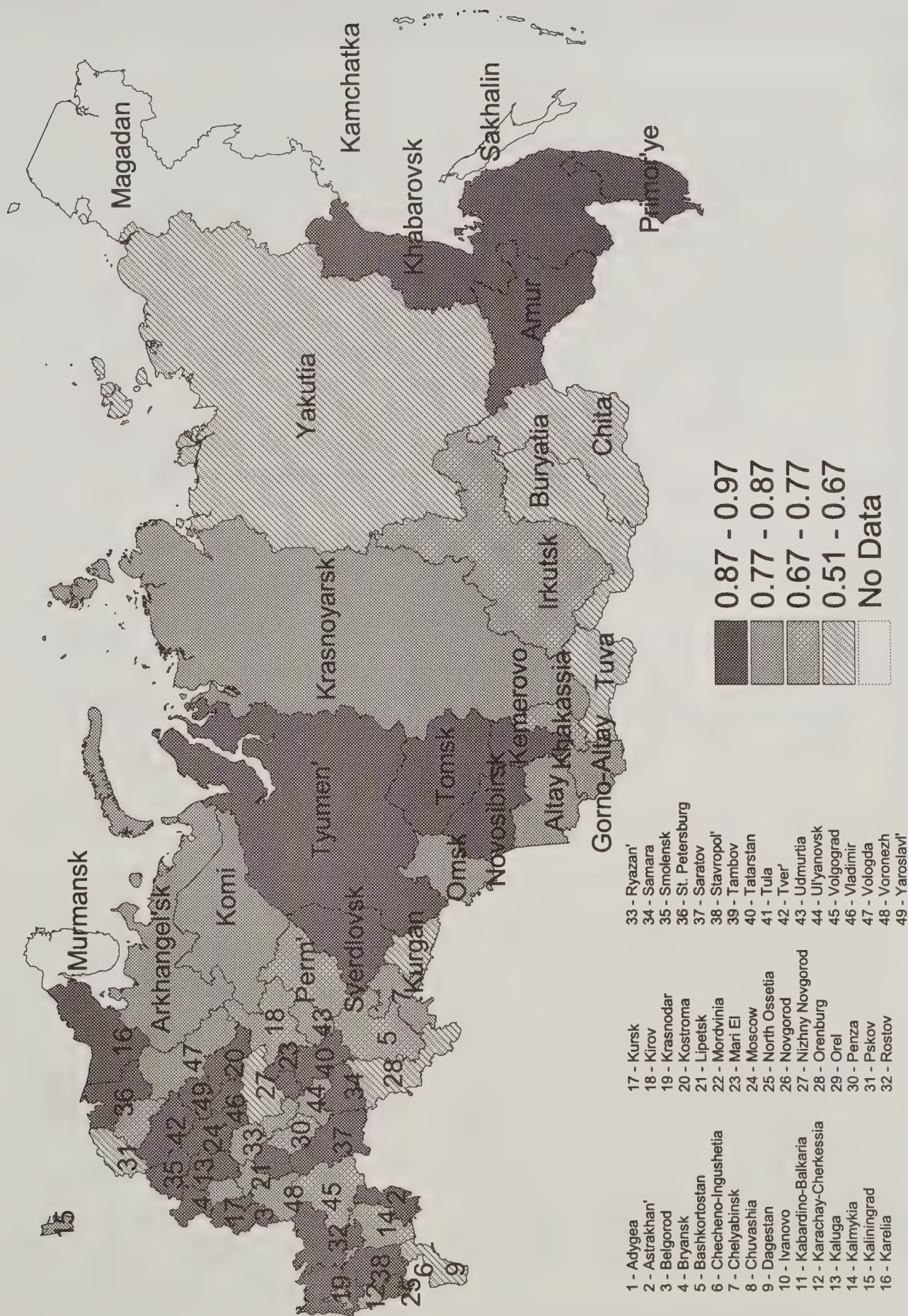
Using previously unavailable oblast-level data from 70 (out of a total 89) regions during 1991-95, we address the following questions: (1) What has been the pattern of the relative average (1993-95) *levels* of technical efficiency of crop production by region? (2) What has been the pattern in the *changes* in technical efficiency by region due to reform from 1991 to 1995? (3) What economic and institutional factors explain the pattern in the *levels* of technical efficiency? And, (4) Does it appear that farms in different regions of Russia are engaging in real or "passive" reform (see box, "Issues Involving Farm Restructuring")?

Technical Efficiency of Russian Crop Production by Region, 1993-95

We first examine the relative levels of crop production efficiency by region in Russia for 1991 through 1995. However, below we report on the 3-year average for 1993-95 of the annual efficiency measures for each region in Russia. We identify which oblasts are able to produce the most crop output (measured in inflation-adjusted aggregate value terms) with the least physical inputs in each year. These oblasts exemplify what is known as the "production frontier" (for each year), since they define the best practice performance. From this frontier, it is possible to measure the relative efficiency for the rest of the oblasts for each year from 1993 to 1995. In our study, an efficiency score of, say, 0.80, indicates that an oblast should have been able to increase its output by another 20 percentage points for its given input levels.

Figure 13 shows the 3-year average level of efficiency of crop production in corporate farms on a scale from 0 to 1 for 1993-95, where a grade of 1 indicates that crop production in the region was the most efficient. The highest levels of crop production efficiency were in the North Caucasus,

Figure 13: 1993-95 Efficiency Level



Measuring and Explaining Efficiency

Measuring efficiency. In our study, we employed two methods to measure technical efficiency so that we could cross check and verify our findings. One method was a statistical approach known as stochastic frontiers. The other was a linear programming approach known as data envelopment analysis (DEA). Although the results presented in this article are the stochastic frontier results, the DEA results were very similar. Both methods only give an indication of relative efficiency for a particular set of observations, not some absolute or global standard. So in this case, we can only measure the relative efficiency scores for the 70 oblasts within Russia, but we can not make any judgements of how these oblasts might compare against provinces or states outside of Russia.

With the stochastic frontier method, output is statistically predicted by examining input levels and assuming a mathematical form. The difference between the actual output and predicted output is known as the residual or error term. If, with stochastic frontiers, the error term is found to be not random, it is explored further. The technique statistically decomposes the error term into a component measuring the degree of inefficiency and the normal random error component.

The DEA method takes a completely different approach. This method challenges the conventional statistical approach by assuming that the upper level observations of a scatterplot are not due to random error, but in fact represent the most efficient observations (which conforms to textbook definitions of a production function). These observations are enveloped by linear segments to approximate a smooth production function. From this frontier envelope, each unit is measured in terms of its distance to the frontier.

Both methods have advantages and disadvantages, which we discuss in our study. Each method can be employed with several variations, which we also explored.

Explaining efficiency. In our study, we not only measure technical efficiency, but we also attempt to explain technical efficiency. For this part, we use an extension of the stochastic frontier model recently developed by Battese and Coelli (1995).¹ In this model, technical efficiency is estimated for each oblast by forming a production frontier with conventional inputs (land, labor, etc.), that allows for the measurement of inefficiency. In addition, a set of variables is regressed on the efficiency scores that purport to explain the differences (for example, privatization, crop specialization, price shocks, etc.).

¹ Battese, George and Tim Coelli, "A Model of Technical Inefficiency Effects in a Stochastic Frontier Production Function for Panel Data," *Empirical Economics* 20: 325-332, 1995.

the Volga Valley, parts of the Central Black Soil region (around Moscow), an area around St. Petersburg, and parts of West and East Siberia.

We are inclined to believe that corporate farms in some oblasts performed better than in others because of higher quality *management*, understood in a broad sense. This is the usual reason given for variations in efficiency in the literature. However, the quality of management depends partly on institutional-environmental factors. For instance, expectations about loan forgiveness (which reflects the softness of the farm budget constraint), as well as undeveloped markets for land and labor, farms size, and other factors, all influence managerial decisions, which in turn influence the efficiency with which farms operate.

It is important to recognize that farm managers may be "rational" while allowing the technical efficiency of their

farms to fall. For example, farm managers may pursue goals other than maximizing profits or minimizing costs, such as retaining workers or land, rent-seeking, or seeking to carry out the wishes of the local authorities. Moreover, if an oblast is relatively remote and faces very high transportation costs, it may be prudent to be relatively self-sufficient.

Changes in the Technical Efficiency of Russian Crop Production by Region, 1991-95

We next examine the changes in efficiency scores of each region from the pre-reform year of 1991 to 1995 (4 years after the beginning of price reform). We estimate that the average efficiency score of Russian regions declined from 0.91 in 1991 to about 0.76 by 1995. Figure 14 shows the percentage changes in the level of crop production efficiency from 1991 to 1995 for selected oblasts.

Issues Involving Farm Restructuring

Genuine restructuring involves serious changes in four areas of farm operation: management and control, internal organization of the business, modernization through capital investment, and social services provided by the enterprise. Of these, management leadership and capital investment might be considered the most critical ingredients. Genuine restructuring of Russian enterprises is usually associated with (1) significant hardening of the enterprise budget constraint, (2) significant outside ownership of the enterprise, and (3) institutions promoting good corporate governance, such as accurate financial disclosure, democratic boards of directors, and independent shareholder registers.

Real restructuring should be distinguished from what some researchers call "defensive" or "passive" restructuring of the survival-oriented enterprise (SOE). In the face of the severe uncertainty that is characteristic of the transition period, SOEs place predominant emphasis on current cash flow, rather than long-run asset value. As SOEs, there are very good reasons to suppose that Russian corporate farms engage predominantly in "passive" rather than genuine restructuring. Russian corporate farms continue to operate under a soft budget constraint (under which they receive soft loans), are organized as closed partnerships, and are run predominantly by the old state and collective farm managers.

Passive restructuring might be characterized by the following:

- *Limited adjustment in the product mix.* Corporate farms continue to produce livestock, for example, despite large financial losses.
- *Continued soft budget constraint.* Overdue loans are continually forgiven, allowing corporate farms to avoid bankruptcy.
- *Modest land adjustment.* Corporate farms do not pay land rents. And because there are no land markets, there is little cost to holding land.
- *Limited expansion of private plot production.* The small size of private land holdings limits the capacity to develop private output.

The obvious and important question about efficiency is whether it is a measure of real restructuring or of simply "passive" changes in farm operation? The answer, we believe, is a little of both. The more positive change in efficiency we see, the more likely we are seeing something that qualifies as real restructuring. The more negative changes in efficiency, the more likely that we are observing not genuine, but passive restructuring of corporate farms.

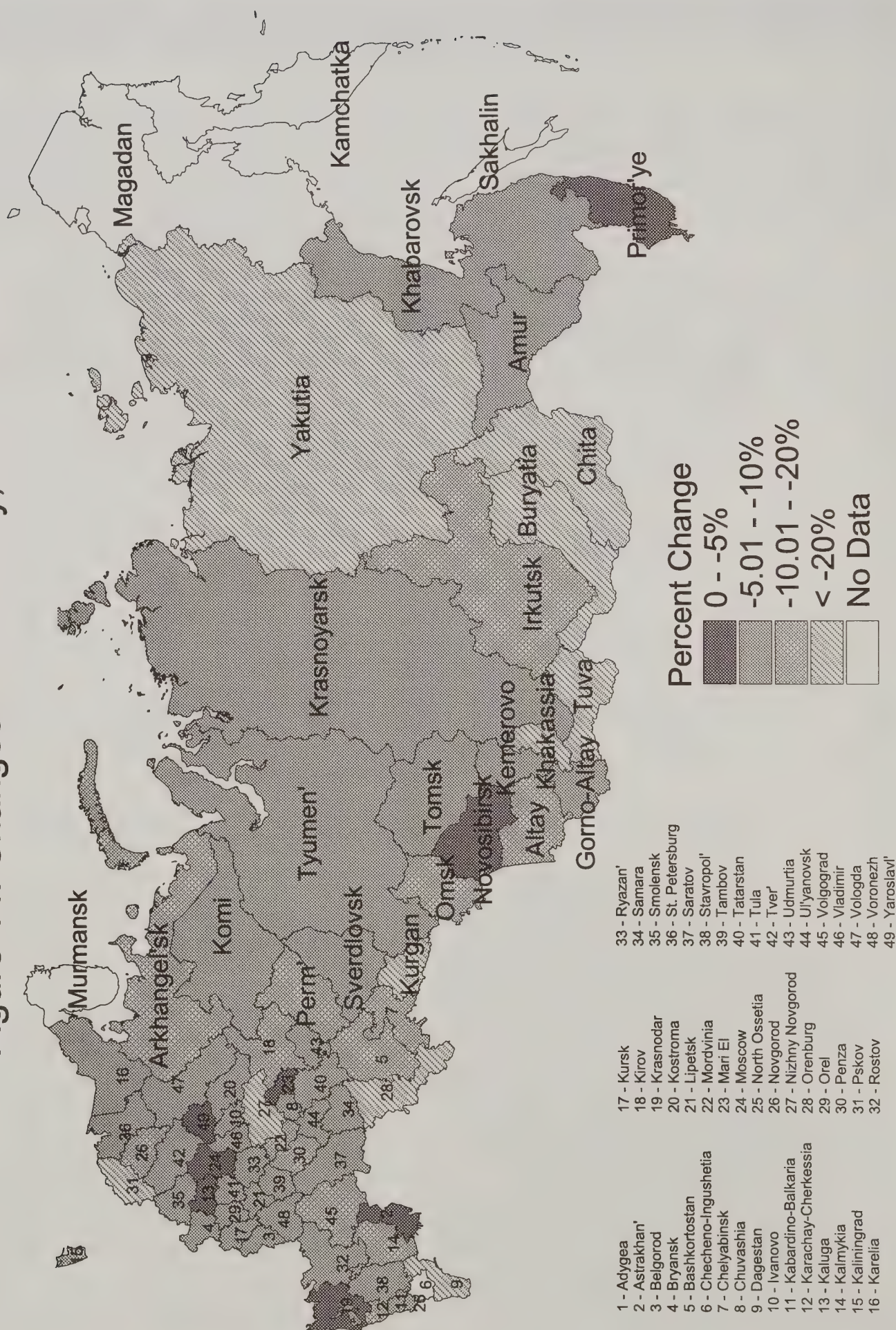
The main picture that emerges is that those areas that were efficient in 1991 have been holding their own, while the efficiency of areas that had low efficiency in 1991 has deteriorated quite rapidly. In other words, the variation in the efficiency performance of oblasts in the Russian Federation increased rapidly. Despite the tendency to grant soft loans to corporate farms (which, it must be said, has become less common in the past few years), the economic shocks that have hit agriculture in the past few years caused less efficient farming oblasts to become even less efficient. Oblasts that have stayed relatively efficient include Astrakhan', Novosibirsk, Krasnodar, and Kursk. Some of the oblasts that have deteriorated the most include Pskov, Khakassia, Karachay-Cherkassia, and Kurgan.

How do we explain this pattern of changes? We can only conjecture, based on our formal work on explaining the levels of technical efficiency (reviewed in the following section), as well as our qualitative knowledge of the patterns of change in Russian agriculture in the past few years.

However, the following scenario is consistent with the observed changes in efficiency of crop production by corporate farms in the past few years. The pattern is consistent with what one would expect following the liberalization of prices with trade under a situation of soft budgets for the relatively inefficient producers. As corporate farms experience negative changes in their terms of trade, those regions with an economic advantage in crops (low-cost producers) continue to produce, while regions with an economic disadvantage in crops cut production significantly. However, production does not cease in these regions altogether, for two reasons. First, oblast governments and corporate farms are reluctant to cease production of crops such as grain or sugar beets, for example, because of concerns about self-sufficiency or keeping processors employed. Second, soft loans or favors compensate corporate farms for such behavior that is often at odds with pure profit maximization.

The above scenario accounts for the continued production of crops in regions that have an economic disadvantage in their

Figure 14: Changes in Efficiency, 1991-1995



production. However, how do we account for the significant worsening of the efficiency of relatively inefficient producers? According to our research, it is precisely the poor performers that tend to receive soft loans, that have a softer budget constraint. However, soft budget constraints tend to encourage behavioral inertia, thus hindering less efficient farms from improving their performance. Soft loans primarily for less efficient farms tend to increase inefficiency on these farms.

Explaining the Level of Technical Efficiency In Russian Regions

Next, we estimate the impact of several factors that we believe explain the static efficiency scores discussed above. The following factors were considered: precipitation, temperature, employees per corporate farm, average farm size (in hectares), percent of crops marketed through state channels, portion of the value of crop production raised privately, percent of agricultural land in private farms, changes in relative output and input prices, subsidies as a percent of total farm revenue, and crop concentration.

We found the following factors were very important in explaining the relative efficiency of corporate farm crop production by oblast:

- *Average farm size:* Larger farms tended to be least efficient. This finding suggests that farms in Russia, on average, employ too much land in crop production. This is not surprising, because the average corporate farm in Russia is six times larger than the largest farms in the United States.
- *Size of labor force:* This finding suggests that labor is scarce on corporate farms, a result consistent with what we know about labor use on corporate farms before reforms. Before reforms, state and collective farms traditionally employed military troops, students, and other city dwellers during the harvest period to augment their labor force. Now that these practices have been curtailed, labor shortages, particularly during harvest, are probably severe. As a result, for corporate farms identical in all other respects, the added benefit of employing another worker most likely exceeds the extra cost of keeping that worker.

This result may appear surprising, as joint stock companies with soft budget constraints in transition economies often retain excess labor, so that the added benefit of employing another worker is small compared to the extra cost of keeping that worker. However, our study concerns exclusively workers employed in crop production. It's possible that corporate farms tend to retain excess labor for livestock production, but our study did not include the livestock sec-

tor. Temporary labor was and is not used for livestock production, only for crops. The results of our study highlight important differences between the two sectors.

- *Changes in the agricultural terms of trade (the ratio of output prices to input prices):* The more agricultural terms of trade worsened, the more farms were forced to improve their efficiency. Such improvement through adversity reflects the fact that price shocks on the input side led to more rational use of inputs, especially fertilizers, which were previously overused.
- *Temperatures:* Hotter than normal temperatures and occasional droughts in critical growing months in some oblasts led to sharp declines in output after inputs had already been used, which had the effect of showing up as a decrease in efficiency.
- *The portion of crops produced in the private sector:* Most crop production (by value) in the private sector is produced on small (0.5 to 1 hectare) private plots attached to the large corporate farms. We found that the greater the share (by value) of crop output produced in the private sector (primarily on these private plots, engaged in intensive cultivation of fruits and vegetables), the less efficient was crop production on corporate farms. We believe this results from the widely reported pilfering of corporate farm inputs (including labor time) by private plot holders. Increases in production on these plots, leading to increased pilfering, would tend to lower the apparent efficiency of corporate farms.

The following factors do not determine efficiency as strongly, but still appear to have a significant impact:

- *Percent of crop marketed through state channels:* The more output that went through old state marketing channels, the less inefficiency there was. This suggests that oblasts that relied on the old channels did not have to incur short-run search and transaction costs and were able to minimize efficiency losses.
- *Percent of land held privately (not collectively):* Although land held by corporate farms is formally privatized, it is owned collectively. Most agricultural land held privately and not collectively is employed in private farms (rather than private plots), which raise field crops such as wheat and sunflower seeds. The oblasts in which corporate farming was most efficient tended to support the most private farming as well. This result appears to indicate that either a legacy of successful farming or less risky natural conditions in certain oblasts encourages both well-managed corporate farms and private farm entrepreneurialism.

- *Subsidies as a percent of revenues:* The higher percentage of subsidies (compared to total revenues), the more inefficient are corporate farms. This suggests that government support policies amount to subsidizing the least efficient corporate farms, and/or that support policies tend to encourage less efficient production.
- *Crop specialization.* The more concentrated the crop mix, the more efficient corporate farm production in the oblast. This result is consistent with the hypothesis that specializing in products in which a region has an economic advantage tends to mitigate efficiency losses.

Our research identified several policy implications for improving efficiency of Russian farms. One important factor is land policy. Our results indicate that the large corporate farms are inefficient. While this is not surprising for those who have followed collective agriculture for years, it points to a rather elementary (but politically impossible at this time) way to improve the efficiency of Russian agriculture: Reduce farm size.

The second area in which efficiency could be improved by policy measures is the granting of soft government loans, exemplified here by subsidies as a portion of revenues. It is clear that the granting of subsidies to less efficient farms is highly correlated both with the year-by-year efficiency scores and with the worsening of efficiency as well.

Third, adverse movement in relative output and input prices appears to be correlated with higher levels of efficiency, as

well as lower losses of efficiency. This adverse movement mainly reflects the rise in input prices, which were previously kept artificially low. The policy implication from this result is that the more liberalized are input prices for farms, the more efficient those farms tend to be.

Lastly, the more specialization in crop production that occurred from 1991 to 1995, the more efficient the farms. This is a clear argument for allowing farms to specialize in the crops in which they have a comparative advantage.

Are Russian Regions Engaging in Real or “Defensive” or “Passive” Restructuring?

The general pattern of declining efficiency scores over time is consistent with earlier studies that concluded Russian corporate farms have been engaging, on the whole, in passive restructuring. One of the most interesting parts of our study, however, is the large variation in performance observed among oblasts. What can explain the generally good performance over time of the small number of oblasts with the highest efficiency scores? We are inclined to believe that managers in the most efficient oblasts are doing a better job of adjusting to the shocks of the past few years. These managers have minimized falls in efficiency, despite difficult conditions that have caused the badly managed farms to incur efficiency declines of 20 percent. In as much as better management is a part of real restructuring, farms in the best performing oblasts appear to have engaged in real restructuring.

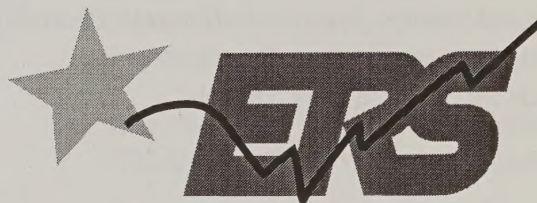
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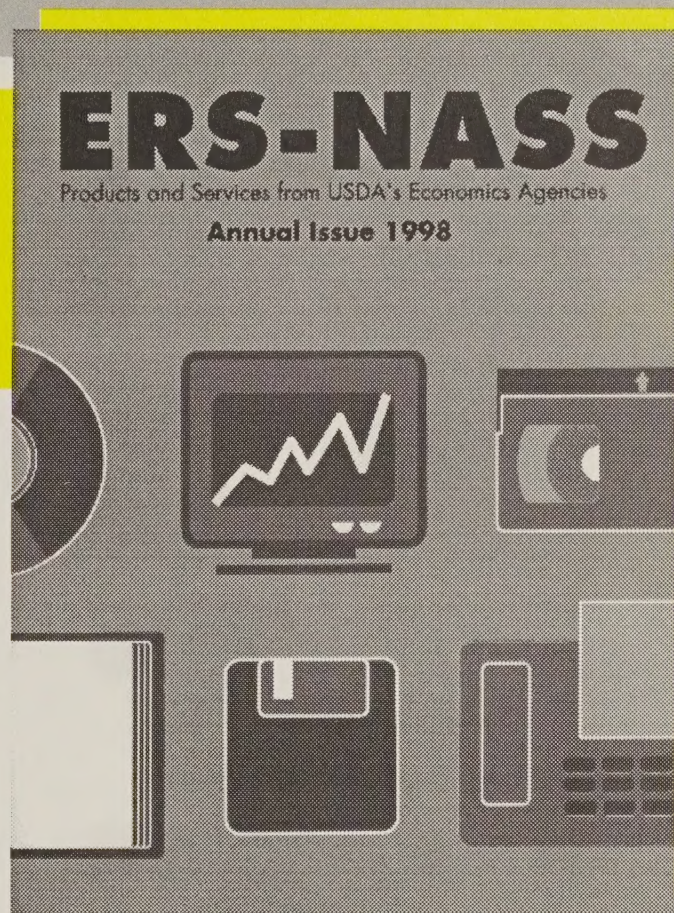
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